Financial Stability Report
Issue No. 8

Reserve Bank of India
December 2013

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Foreword

The Financial Stability Report (FSR) for Dec 2013 is being released once again in uncertain times. The US Federal Reserve (Fed) having announced tapering of its QE-3 has finally laid to rest uncertainties on the timing of the initiation of exit, but the pace of exit and the market reaction and adjustment to the withdrawal of liquidity will have to be watched carefully. The commencement of taper should signal a calibrated return to normal liquidity and credit conditions in the global markets and also better pricing of risk. This will mean a repricing of certain assets with consequent volatility. In India, a potential additional source of uncertainty is the coming general election. A stable new government would be positive for the economy. With confidence in the financial system still fragile, six years into the crisis, policy certainty is something investors look for in the current environment.

Despite evidence that the outcomes of the recent spells of easing have had diminishing positive effects on the real sector, central banks seem likely to continue their easy policies to support asset prices. The global financial system appears to have become acclimatized to the current levels of liquidity, so eventual exit could be disruptive. Efforts during the past few months have been directed to make the Indian economy more resilient to the ultimate withdrawal of liquidity from the system and less reliant on unstable external capital for growth. The Fed's announcement that it will phase out QE-3 is a welcome signal that conditions have started on the path of normalization.

The previous FSR was released at a time of volatility unleashed by the Fed's announcement of tapering. As tapering got postponed, EMDEs like India got time to put their house in order. Macroprudential policy measures initiated by the Reserve Bank and the Government have brought some stability to the markets and exchange rate volatility has been contained thus far. The current account deficit has narrowed to sustainable levels. Foreign exchange reserves are adequate and fiscal consolidation is in progress. The outlook for the economy has improved, with export growth regaining momentum, but growth is still weak. The challenges of containing inflationary pressures limit what monetary policy can do. To maintain the momentum gained by the respite, it is imperative that long-delayed legislative reforms are pushed through, stalled infrastructure project clearances continue and fiscal consolidation remains on track.

Non Performing Assets (NPAs) of the banking sector need to be tackled on a priority basis to ensure that they do not grow to alarming proportions. The current level of NPAs do not pose a systemic concern as the CRAR of the banking system is above the prescribed levels and many projects are just delayed, not unviable. But we cannot be complacent.

The FSR outlines the macro financial risks to the financial system and brings out the results of a series of stress tests on the banking system. The report has an in-depth analysis of the asset quality in the banking system and traces the causes leading to the current state of affairs. In addition, the report attempts a study of the vulnerabilities in the corporate sector and developments in various market segments. The stress tests assume extreme conditions and tail events and show that the financial system in India is resilient to stresses at this point in time though continued vigilance is warranted. The report also covers the progress in implementation of post crisis reforms.

The ultimate objective of a stable financial system is to support a vibrant and growing economy and offer easy access to financial services across the country to all of its population. The FSR is a useful periodical health check of our financial system and I hope this issue once again provides useful inputs to all stakeholders.

Raghuram G. Rajan
Governor

December 30, 2013

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List of Select Abbreviations

AEs	Advanced Economies
AFS	Available for Sale
ALM	Asset Liability Management
APMC	Agriculture Produce Marketing Committee
AR	Autoregression
ATM	Automated Teller Machine
AUM	Assets Under Management
BCBS	Basel Committee On Banking Supervision
BCP	Business Continuity Plan
BE	Budget Estimate
BIS	Bank for International Settlements
BPL	Below Poverty Line
BSE	Bombay Stock Exchange
BSI	Banking Stability Index
BSMD	Banking System's portfolio Multivariate Density
BSMs	Banking Stability Measures
CAD	Current Account Deficit
CALCS	Capital adequacy, Asset quality, Liquidity, Compliance and System & control
CAMELS	Capital adequacy, Asset quality, Management, Earning, Liquidity and System & control
CAP	Corrective Action Plan
CBLO	Collateralized Borrowing and Lending Obligation
CBS	Core Banking Solution
CCIL	Clearing Corporation of India Limited
C-D	Credit-Deposit
CDs	Certificates of Deposits
CDS	Credit Default Swap
CDSL	Central Depository Services Limited
CET1	Common Equity Tier 1
CFSA	Committee on Financial Sector Assessment
CFTC	Commodity Futures Trading Commission
CIMDO	Consistent Information Multivariate Density Optimizing
CP	Commercial Paper
CPI	Consumer Price Index
CPSS	Committee on Payment and Settlement Systems
CRAR	Capital to Risk Weighted Assets Ratio
CRR	Cash Reserve Ratio
CV	Coefficient of Variation
DB	Defined Benefit
DC	Defined Contribution
DCCBs	District Central Co-operative Banks
DICGC	Deposit Insurance and Credit Guarantee Corporation
DR	Disaster Recovery
D-SIBs	Domestic Systemically Important Banks
EAD	Exposure At Default
EBA	European Banking Authority
EBIT	Earnings Before Interest, Tax
EBITDA	Earnings Before Interest, Tax,Depreciation and Amortisation
ECB	External Commercial Borrowing
EFSF	European Financial Stability Facility
eIA	Electronic Insurance Account
EL	Expected Loss
EMDEs	Emerging Market and Developing Economies
EMEs	Emerging Market Economies
EMV	Europay, MasterCard and Visa
ES	Expected Shortfall
ESM	European Stability Mechanism
ESMA	European Securities and Markets Authority
EU	European Union
EXIM	Export Import
FBs	Foreign Banks
FCNR(B)	Foreign Currency Non-Resident (Borrowing)
FCRA	Forward Contracts (Regulation) Act
FDI	Foreign Direct Investment
FED	Federal Reserve

FIIs	Foreign Institutional Investors
FIMMDA	Fixed Income Money Market and Dervatives Association Of India
FIs	Financial Institutions
FMC	Forward Markets Commission
FMI	Financial Market Infrastructure
FOMC	Federal Open Market Committee
FRBMA	Fiscal Responsibility and Budget Management Act
FSAP	Financial Sector Assessment Programme
FSB	Financial Stability Board
FSDC	Financial Stability and Development Council
FSR	Financial Stability Report
FX	Foreign Exchange
GCF	Gross Capital Formation
GDP	Gross Domestic Product
GFC	Global Financial Crisis
GFCE	Government Final Consumption Expenditure
GFD	Gross Fiscal Deficit
GNPA	Gross Non Performing Asset
GOI	Government of India
G-Secs	Government Securities
G-SIBs	Global Systemically Important Banks
G-SIFIs	Global Systemically Important Financial Institutions
HFCs	Housing Finance Companies
HFT	Held for Trading
HLSC	High Level Steering Committee
HTM	Held to Maturity
IAIG	Inter-Agency Implementation Group
IBA	Indian Banks Association
ICCL	Indian Clearing Corporation Limited
IFP	Institute of Financial Planning
IIBs	Inflation Indexed Bonds
IMF	International Monetary Fund
INR	Indian Rupee
IOSCO	International Organisation of Securities Commission
IRDA	Insurance Regulatory and Development Authority
IRF	Interest Rate Futures
IRS	Interest Rate Swap
ISO	International Organization for Standardization
IT	Information Technology
IVR	Interactive Voice Response
JLF	Joint Lenders' Forum
JPoD	Joint Probability of Distress
LEI	Legal Entity Identifier
LGD	Loss Given Default
MFs	Mutual Funds
MIBOR	Mumbai Inter-Bank Offer Rate
MMMFs	Money Market Mutual Funds
MNOs	Mobile Network Operators
MOTO	Mail Order Telephone Order
MSE	Medium and Small Enterprises
MSF	Marginal Standing Facility
MTM	Mark to Market
NABARD	National Bank for Agriculture and Rural Development
NAV	Net Asset Value
NBFC-ND-SI	Non-Banking Financial Company - Non-Deposit taking - Systemically Important
NBFCs	Non Banking Financial Companies
NBFC-SI	Non-Banking Financial Company - Systemically Important
NBFIs	Non Banking Financial Institutions
NDS	Negotiated Dealing System
NGNF	Non-Government Non-Financial
NHB	National Housing Bank
NPA	Non Performing Asset
NPBs	New Private Banks
NPS	National Pension System
NRE	Non-Resident External
NRI	Non Resident Indian
NSAP	National Social Assistance Programmes
NSCCL	National Securities Clearing Corporation Limited
NSDL	National Securities Depository Limited
NSE	National Stock Exchange

NSEL	National Spot Exchange limited
NSFE	National Strategy for Financial Education
OBUs	Overseas Banking Units
OECD	Organization for Economic Co-operation and Development
OFIs	Other Financial Intermediaries
OIS	Overnight Index Swap
OMCs	Oil Marketing Companies
OMO	Open Market Operation
OPBs	Old Private Banks
OPEC	Organization of Petroleum Exporting Countries
OSS	Off-Site Surveillance
OTC	Over The Counter
P2P	Peer-to-Peer
PAN	Permanent Account Number
PAT	Profit After Tax
PD	Probability of Default
PDs	Primary Dealers
PFCE	Private Final Consumption Expenditure
PFMIs	Principles for Financial Market Infrastructure
PFRDA	Pension Fund Regulatory and Development Authority
PIN	Personal Identification Number
PLR	Prime Lending Rate
PoD	Probability of Distress
POS	Point-of-Sale
PSBs	Public Sector Banks
PSU	Public Sector Undertaking
QE	Quantitative Easing
RBI	Reserve Bank of India
RBS	Risk Based Supervision
REER	Real Effective Exchange Rate
REITs	Real Estate Investment Trusts
RFIs	Refinancing Institutions
RoA	Return On Assets
RoE	Return on Equities
ROs	Representative Offices
RRBs	Regional Rural Banks
RTGS	Real Time Gross Settlement
RWA	Risk Weighted Assets
SCBs	Scheduled Commercial Banks
SCV	Single Customer View
SEBI	Securities and Exchange Board of India
SEC	Securities and Exchange Commission
SGF	Settlement Guarantee Fund
S-I	Saving-Investment
SIDBI	Small Industries Development Bank of India
SIFIs	Systemically Important Financial Institutions
SLI	Systemic Liquidity Index
SLR	Statutory Liquidity Ratio
SMS	Short Message Service
SPARC	Supervisory Programme for Assessment of Risk and Capital
SRS	Systemic Risk Survey
SSM	Single Supervisory Mechanism
SUCBs	Scheduled Urban Cooperative Banks
TBTF	Too-Big-To-Fail
TI	Toxicity Indices
TLI	Term Lending Institution
UCBs	Urban Cooperative Banks
UL	Unexpected Loss
US	United States
USD	United States Dollar
USSD	Unstructured Supplementary Service Data
VAPT	Vulnerability Assessment and Penetration Testing
VAR	Vector Autoregression
VaR	Value at Risk
VI	Vulnerability Indices
WEO	World Economic Outlook
WI	When Issued
WPI	Wholesale Price Index
XBRL	Extensible Business Reporting Language
XML	Extensible Mark-up Language
Y-o-Y	Year-on-Year

Overview

Macro-financial Risks

Global Economy and Markets

The tapering in the US Federal Reserves' bond purchase programme is set to begin from January 2014. The initial reaction of financial markets to the announcement has been positive, having been anticipated and therefore factored-in. Fed's forward guidance on the policy rates has also had a reassuring impact. However, financial market volatility will be conditioned by the pace of tapering going forward.

Against this background, the interplay of growth-inflation dynamics between advanced economies (AEs) and emerging market and developing economies (EMDEs) (convergence in growth and divergence in inflation) may increase vulnerabilities for EMDEs. To reduce spillovers from AE monetary policy normalisation, EMDEs will have to strengthen national balance-sheets. High global liquidity amid persistently low interest rates in AEs has been pushing up asset prices.

Domestic Economy and Markets

The delay in tapering allowed India to bring about adjustment in the current account deficit (CAD) and build buffers by replenishing its foreign exchange reserves. However, macro-economic adjustment is far from complete, with persistence of high inflation amidst growth slowdown. Fall in domestic savings and relatively high fiscal deficit are other major concerns for India. Reviving Fiscal Responsibility legislation and a gradual reduction in government borrowings can complement financial market development and improve confidence in the economy.

Corporate performance continues to be weighed down by boom period expansions and excess capacities, amid shifting asset composition towards financial investments. House prices and outstanding loans for retail housing by housing finance companies have grown relatively fast during the last few years. Inadequate social security coverage in India against a backdrop of changing demographics will pose challenges for expanding the pension system given the fiscal constraints. The NPS was created to serve the Government employees and private sector workers.

Financial Institutions: Soundness and Resilience

Scheduled Commercial Banks

The risks to the banking sector have further increased during the past half-year. All major risk dimensions captured in the Banking Stability Indicator show increase in vulnerabilities in the banking sector. Banking Stability Measures, based on co-movements in banks' equity prices, also indicate that the distress dependencies within the banking system have risen during this period.

Contagion Risks in the Banking Sector

Network tools have been used to assess impact of contagion due to risk of credit concentration. Failure of a major corporate or a major corporate group could trigger a contagion in the banking system due to exposures of a large number of banks to such corporates. The analysis shows that interconnectedness in the banking sector could cause losses due to contagion, over and above the direct losses on account of the failure of large corporate groups.

Trends in Credit and Deposit Growth

In the recent quarters, credit growth has exceeded the growth in deposits. As a result, there has been a significant rise in the incremental C-D ratio.

Asset Quality Concerns

Asset quality continues to be a major concern for Scheduled Commercial Banks (SCBs). The key aspects of deterioration in asset quality are:

- A rising trend in Risk Weighted Assets (RWA) to total assets along with declining trend in Coefficient of Variation (CV) indicates that the

rise in proportion of risky assets in the total assets of SCBs is becoming more broad-based.

- The Gross Non-performing Assets ratio of SCBs as well as their restructured standard advances ratio have increased. Therefore, the total stressed advances ratio rose significantly to 10.2 per cent of total advances as at end September 2013 from 9.2 per cent of March 2013.
- The largest contribution to stressed advances comes from the PSU banks.
- The 'medium and large' sized industries contributed more towards stressed advances than 'micro & small' sized industries.
- Industries recorded the highest share in restructured standard advances and with relatively high GNPAs contributed the highest share of stressed advances in the banks' loans portfolio followed by Services. Retail segment fared much better in terms of GNPA and restructured standard advances ratios.
- Five sectors, namely, Infrastructure, Iron & Steel, Textiles, Aviation and Mining together contribute 24 percent of total advances of SCBs, and account for around 53 per cent of their total stressed advances.

To address various issues relating to asset quality, Reserve Bank, *inter alia,* has brought out a discussion paper on "Early Recognition of Financial Distress, Prompt Steps for Resolution and Fair Recovery for Lenders: Framework for Revitalising Distressed Assets in the Economy".

Stress Tests

Macro stress tests on credit risk suggest that if the adverse macroeconomic conditions persist, the credit quality of commercial banks could deteriorate further. However, under improved conditions, the present trend in credit quality may reverse during the second half of 2014-15 with the GNPA ratio expected to rise initially to around 4.6 per cent by September 2014 from 4.2 per cent as at end September 2013, which may subsequently improve to 4.4 per cent by March 2015.

Systemic Risk Survey

According to the results of Reserve Bank's latest Systemic Risk Survey, conducted during October 2013, global risks and domestic macro-economic risks were perceived to be the two most important factors affecting the stability of Indian financial system. On the domestic macro-economic front, deterioration in economic outlook is considered to be the most critical. Risk from domestic inflation, corporate leverage and household savings have also increased marginally. On the other hand, risks arising from CAD, fiscal, sovereign downgrade and infrastructure were perceived to have receded.

Regulation of Financial Markets, Institutions and Infrastructure

Too-Big-To-Fail and Shadow Banking

India stands committed to the implementation of the global regulatory reforms agenda and has made considerable progress on this front. Although firms and markets are beginning to adjust to the regulatory approach towards ending too-big-to-fail (TBTF), recent research indicates continued expectation of sovereign support to such institutions. In India, the process of identification of financial conglomerates and their joint supervision/ regulation have received a lot of attention. Some global reform measures, *e.g.* those related to shadow banking may need to be adopted selectively, based on their relevance to the domestic financial system.

Money Market Mutual Funds

Due to the interconnectedness with banks, liquidity pressure is felt by the money market mutual funds (MMMFs) whenever redemption requirements of banks are large and simultaneous. Regulatory measures taken to reduce the degree of interconnectedness seem to have been successful in reducing the liquidity risk in the system.

Financial Benchmarks

Although there have been no major instances of manipulation of market rates in India's domestic markets, the Reserve Bank has constituted a committee to conduct a review of the systems and procedures in place with regard to major financial benchmarks.

Some Issues in Indian Financial Markets

Action to create central repositories for the banking sector, corporate bond market and insurance sector has been initiated. This move is expected to break the information asymmetry in those markets.

India's domestic markets for derivatives have not taken off due to the absence of some of the basic building blocks. Efforts are on to address these issues.

It has also been observed that the equity prices of the companies in which the promoters had pledged significant portions of their shares, are relatively more volatile than the broader market during times of correction.

Payment and Settlement Systems

The payment and settlement system infrastructure in the country continued to perform without any major disruptions.

Financial Stability and Development Council (FSDC) and its Sub Committee

The Financial Stability and Development Council (FSDC) and its Sub Committee deliberated on various aspects that impinge on financial stability - macroeconomic scenario, both global and domestic and the developments in financial markets.

Chapter I

Macro-Financial Risks

The US Federal Reserve (Fed) announced tapering in its bond purchase programme on December 18, 2013. Financial markets had been expecting this move since the first indication of such action in May 2013. Initial reaction to the tapering announcement has been positive.

Growth differential between advanced economies (AEs) and emerging market and developing economies (EMDEs) has been narrowing, while the inflation differential has been widening. The resultant risk-return dynamics seem to favour AEs, thereby increasing the vulnerability of the EMDEs.

India utilised the delay in tapering to bring about adjustment in the current account deficit (CAD) and built buffers by replenishing its foreign exchange reserves. Consequently, external sector risks have been considerably reduced and the effect of the tapering on the economy is expected to be limited and short lived. However, macro-economic adjustment is far from complete, with persistence of high inflation amidst growth slowdown. Fall in domestic savings rate and high fiscal deficit continue to pose challenges for India.

The Indian economy staged a small recovery in the second quarter of the current fiscal year with growth at 4.8 per cent, an improvement over the previous quarter's 4.4 per cent with improvement in growth spread across sectors. On the external front, the CAD moderated sharply to 1.2 per cent of GDP during Q2 2013-14 due to a decline in the trade deficit.

Boom period expansions that led to excess capacities and structural impediments continue to weigh on corporate performance. Asset composition of corporate balance-sheets shows a shift towards increased financial investments.

Foreign Institutional Investors (FIIs) continue to remain significant players in the domestic equity markets, despite some fall in their ownership of index stocks after June 2013. As such, entities with equity market exposure need to brace for any future volatilities which might result from perceived changes in relative returns across markets.

Global Backdrop

1.1 The previous Financial Stability Report (FSR) was published against the backdrop of uncertainty and volatility unleashed by the US Federal Reserves' (Fed) intent of tapering its bond purchases programme, first indicated in May 2013 and reaffirmed in June 2013. Emerging market and developing economies (EMDEs) witnessed huge outflows from their debt and equity markets and large depreciation of their currencies following the May 2013 announcement. Apart from policy measures to address adverse current account balances, various capital control measures had to be resorted to by affected economies to stem the sharp fall of their currencies. A semblance of stability returned to financial markets when fears of tapering receded in September 2013. While the May – June events offered a preview of what would follow a change in ultra-easy monetary policies in advanced economies (AEs), the respite offered time to policy makers to improve the resilience of their economies to face the effects of tapering, eventually with less deleterious impact.

1.2 This FSR is being finalised at a time when the Fed has laid to rest the uncertainty on timing of the exit. This time around, financial markets seem to have factored-in the tapering and have reacted generally positively to the announcement. The Fed's forward guidance of maintaining highly accommodative stance of monetary policy for a considerable period of time after the asset purchase program ends and further strengthening of US economic recovery also provided more clarity on the movement of policy interest rates. With the Fed

announcing a tapering of USD 10 billion, beginning in January 2014, in its monthly USD 85 billion bond purchase programme, volatility in financial markets henceforth will be conditioned by changes in the pace of tapering.

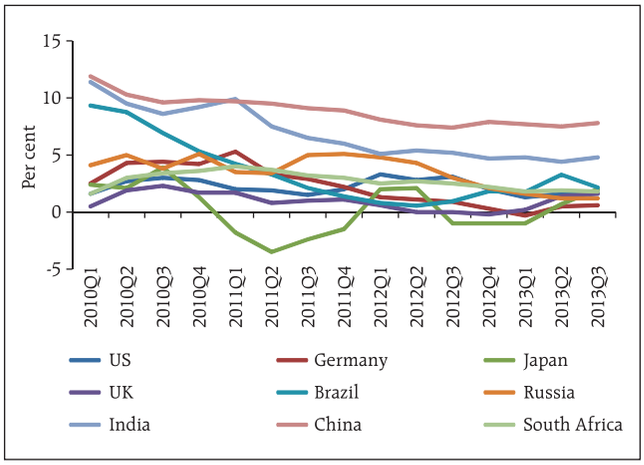
1.3 In the meanwhile, Euro Area has made progress in moving towards a banking union. Declining inflation and tepid growth in the region necessitated reduction in policy rates. There have been concerns that Germany's persistent and large current account surplus might be hampering 'rebalancing' in the Euro Area. Economic policies in Japan seem to have improved sentiments and boosted growth. Growth in China during Q3 2013 has been better than expectations.

Growth-Inflation Dynamics - Challenges for EMDEs

1.4 Realignment of global growth is likely to result in volatile cross-border flows, thus posing threats to financial stability especially in EMDEs. With the growth differential between AEs and EMDEs narrowing (Chart 1.1), large gyrations in financial markets are likely with every re-pricing of risk. Relatively slower growth in EMDEs may tilt the risk-return structure in favour of AEs which could lead to capital outflows from EMDEs when global liquidity falls. Going forward, potential debt ceiling brinksmanship in the US in early 2014 could re-enact the events witnessed earlier.

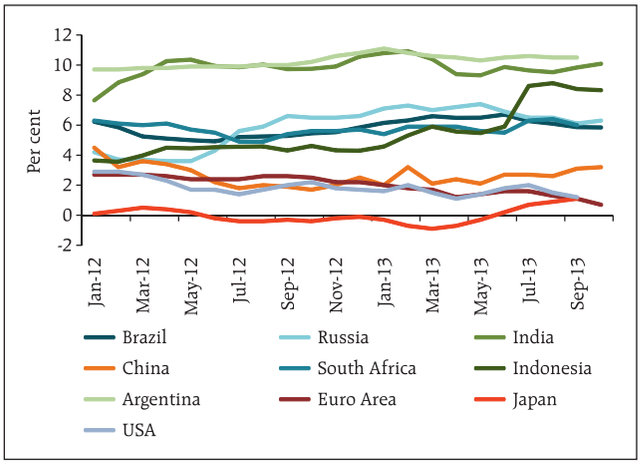
1.5 Most AEs are faced with low and falling inflation and are constrained to keep interest rates low or near zero for an extended period. Some EMDEs like Argentina, India and Indonesia among others are experiencing high inflation (Chart 1.2). The resultant inflation differential between some of the EMDEs and AEs is a potential source of volatility in exchange rates as capital flows could change direction abruptly. In this context, it is imperative for India to contain inflation and strengthen the economy before further reversal of easy money policies in the AEs materialises. Inflation management remains a major challenge for

Chart 1.1: GDP Growth



Source: Bloomberg

Chart 1.2: CPI Inflation



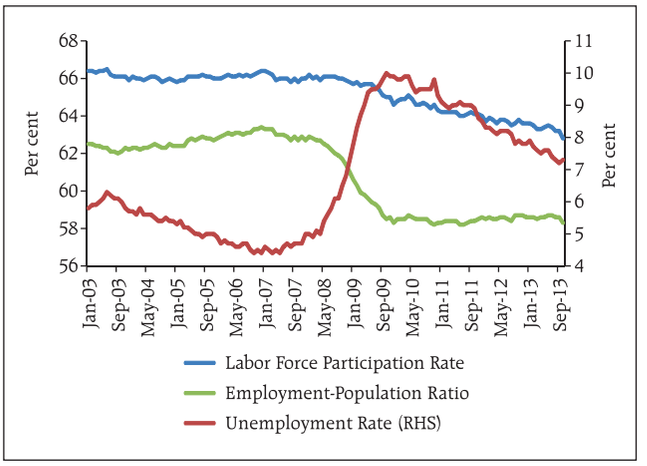
Source: Bloomberg

India in an environment of sluggish growth and significant differential between the food price inflation and manufacturing prices inflation.

1.6 With unemployment rate falling in the US, phased withdrawal from the Fed's bond purchase programme has materialised. However, the fall in unemployment rate has come on the back of a fall in the labour force participation rate as well as near stagnant employment-population ratio at a low level (Chart 1.3). In addition, even with large monetary policy accommodation, inflation as measured by the annual change in price index for personal consumption expenditures in the US is below the Fed's target of 2 per cent and could pose challenges for growth going forward. The Euro Area has similar concerns with negative GDP growth (Y-o-Y) during Q3 2013 and inflation much below the European Central Bank's (ECB) target, prompting a policy rate cut.

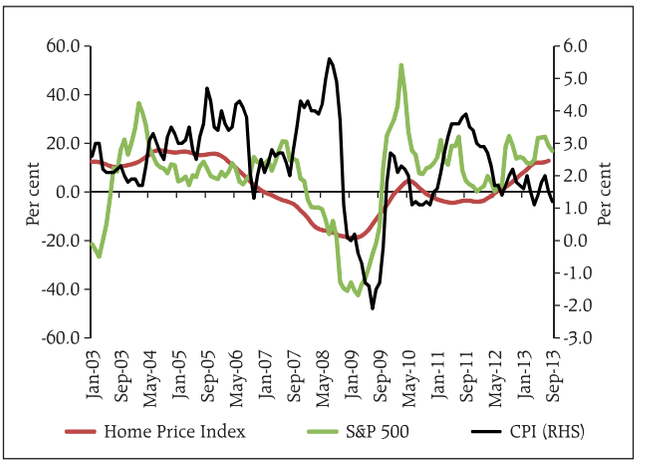
1.7 Easy money policies in AEs, however, have been pushing up asset prices with little perceptible effect on consumer prices (Chart 1.4). Search for yield continues unabated after having moderated briefly during mid-2013 (Chart 1.5). Paradoxical as it may seem, the response to global financial crisis (GFC) which was, to a large extent, perpetuated by an extended period of low interest rates and excess liquidity, has once again been extended periods low interest rates and easy liquidity. While initial unconventional policies contributed to improved market functioning, keeping interest rates low to artificially pump prime markets could accentuate the vulnerabilities already built in. Some of the vulnerabilities played out after the announcement of tapering of quantitative easing (QE) by the Fed in May 2013.

Chart 1.3: US Unemployment Statistics



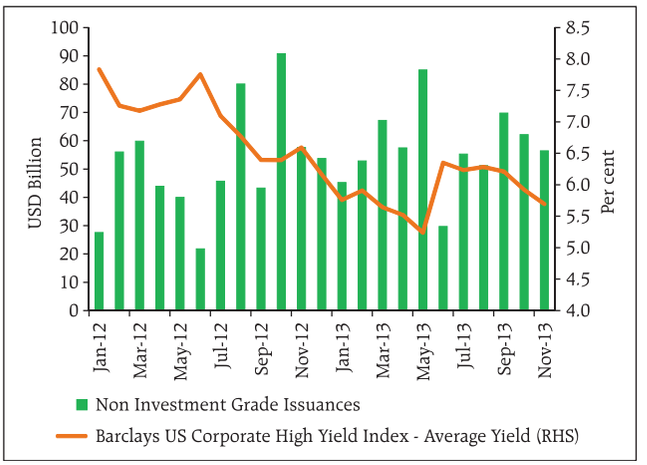
Source: Bureau of Labour Statistics, United States Department of Labour

Chart 1.4: Y-o-Y Asset Price Change and Inflation: US



Note: Home Price Index refers to the S&P Case-ShillerComposite-20 Home Price Index
Source: Bloomberg

Chart 1.5: Non-Investment Grade Corporate Debt: US



Note: Data updated up to November 30, 2013
Source: Bloomberg

Domestic Economy

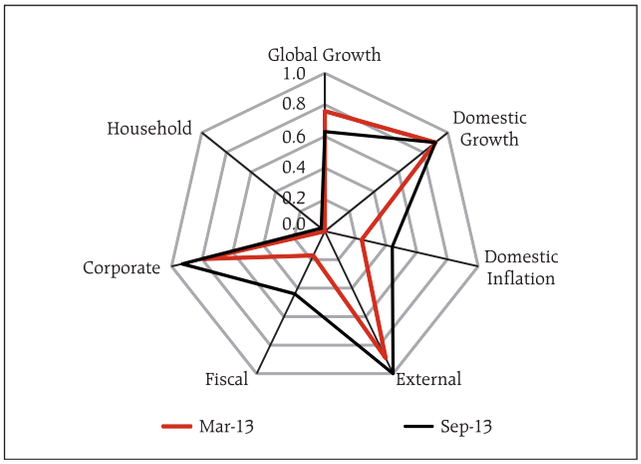
Macro Economic Risks

1.8 Against this backdrop, macro-economic risks facing the Indian economy increased (Chart 1.6) between March 2013 and September 2013 though some risks have fallen since then.

1.9 Real GDP growth in India moderated to 5.0 per cent during 2012-13 from 6.2 per cent in 2011-12, and slackened further to 4.4 per cent during Q1 2013-14 before improving marginally to 4.8 per cent during Q2 2013-14. Sub sectors such as agriculture, manufacturing, electricity, construction and financing and business services witnessed an improvement in performance during Q2 *vis-a-vis* the corresponding period of the previous year, in contrast to the broad-based deceleration in the previous quarter. On the whole, GDP growth rate in the first half of 2013-14 (H1) was placed at 4.6 per cent as compared to 5.3 per cent in H1 2012-13. Supply constraints and high inflation, however, continued to weigh on the growth process. Aggregate demand during Q2 2013-14 picked-up primarily on account of exports and, to some extent, fixed investment. While private final consumption expenditure (PFCE) decelerated during Q2, government final consumption expenditure (GFCE) declined by 1.1 per cent as compared with a strong growth of over 10 per cent in the previous quarter.

1.10 A modest improvement in growth is envisaged in the second half of 2013-14, on the back of a good monsoon which has boosted the *kharif* prospects. Exports have picked up with exchange rate adjustment, and global growth is expected to improve from 2.9 per cent in 2013 to 3.6 per cent in 2014[1]. On the policy front, the government has initiated action in clearing projects especially in the infrastructure sector, which is expected to improve the overall investment climate. These measures would, however, take time to translate into activity at the ground-level. The revival

Chart 1.6: Macroeconomic Risk Map



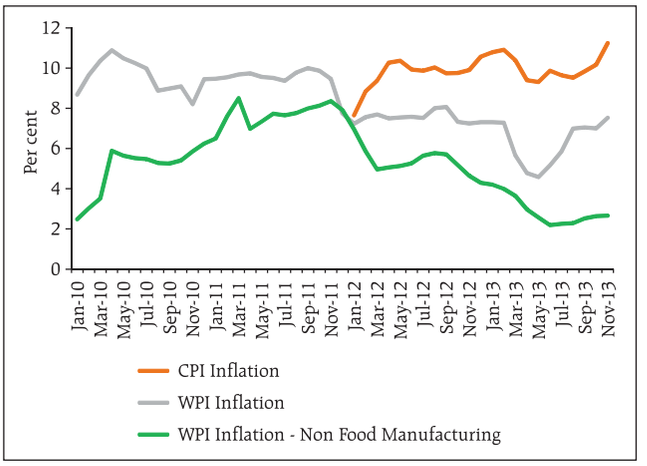
Note: Latest data for External dimension pertain to June 2013. Movement away from the centre depicts increasing risks. Refer to Annex-2 for Methodology.
Source: RBI Staff Calculation

[1] WEO-October 2013, IMF

of large stalled projects cleared by the Cabinet Committee on Investment are likely to buoy investment and overall activity towards the end of fiscal year. The downside risks to the domestic growth stem from persistently high inflation (Chart 1.7), relatively high fiscal deficit and consequent pressure on interest rates and uncertainty in the global environment.

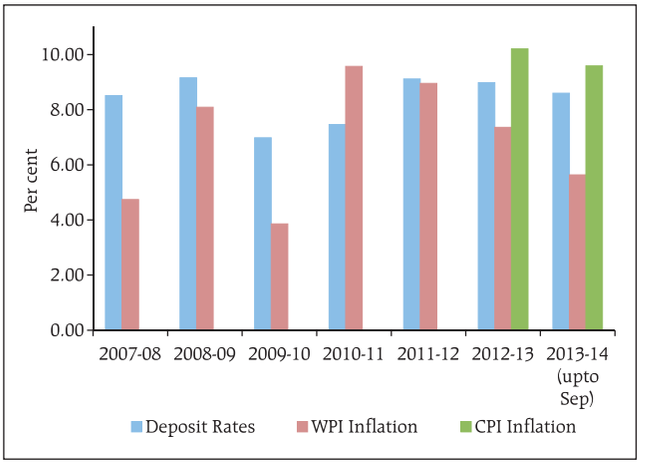
1.11 The disinflationary effect of growth slowdown has not been witnessed as the pass-through of rupee depreciation into prices of manufactured products has been taking place, while food and fuel inflation have been elevated in the absence of supply side response and high wage inflation. Wholesale price index (WPI) inflation remained around/above 7 per cent for the fourth consecutive month in November 2013. Retail inflation measured by the consumer price index (CPI) also rose sharply and crossed the 11 per cent mark in November 2013. Even as some moderation is expected in food inflation going forward, persistence of retail inflation remains a concern. To address the inflationary concerns and to strengthen the environment for sustainable growth by fostering macroeconomic and financial stability, monetary policy was tightened in September 2013 and October 2013 by a cumulative 50 basis points hike in repo rate.

Chart 1.7: Inflation in India



Source: Calculated using GoI Data

Chart 1.8: Bank Deposit Rate and Inflation



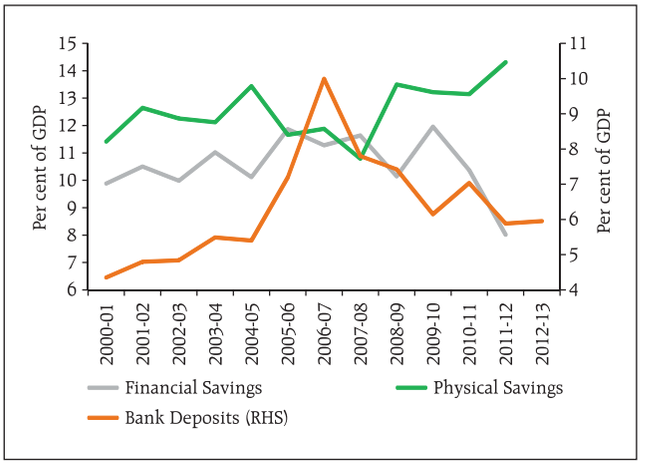
Note: Data on bank deposit rates pertain to the average of minimum and maximum interest rates on 1 -3 years maturity deposits for Public Sector Banks. Data are monthly averages
Source: RBI

Inflation and Household Financial Savings

1.12 In addition to the uncertainty which persistently high inflation brings to the business environment, it also adversely affects purchasing power, consumption and inflation adjusted returns on assets. This is particularly true of inflation adjusted returns on bank deposits (Chart 1.8).

1.13 One possible consequence of this has been a fall in net financial assets of households as a percentage of GDP. Money saved in bank deposits as a percentage of GDP by households has also fallen from the highs of the mid-2000s (Chart 1.9). On the other hand, non-financial assets seemed to have

Chart 1.9: Household Savings



Source: RBI

enabled households to earn relatively better inflation adjusted returns. Further, differential tax treatment of bank deposits, capital market instruments and non-financial assets like real-estate also creates a bias against bank deposits, which account for a significant proportion of household financial assets. A fall in savings has widened the saving-investment (S-I) gap increasing the economy's dependence on external capital. Recent measures such as the re-introduction of inflation indexed bonds (IIBs) and introduction of CPI linked saving certificates for retail customers are part of the strategy to encourage investors to invest in financial assets. Further Securities and Exchange Board of India (SEBI) recently brought out the draft consultation paper on Real Estate Investment Trusts (REITs).

External Sector Vulnerabilities

1.14 Against the backdrop of a large CAD and dependence on volatile capital flows to fund it, the Indian rupee had depreciated following the Fed's May 2013 indication of possible tapering in its bond purchase programme. There have been significant improvements on the external front since then, following measures initiated by the Government of India (GoI) and the Reserve Bank (Box 1.1). The current account deficit (CAD) during Q2 2013-14 fell sharply to 1.2 per cent of GDP from 4.9 per cent

Box 1.1: External Sector Stabilisation Measures

Delay in tapering by the Fed following its initial announcement in May 2013, offered time for India and other EMDEs to undertake measures to improve the resilience of their economies to withstand the effects of inevitable tapering. India took a series of co-ordinated measures which seem to have worked well. Some of these are outlined below:

Measures to Augment Flows:

(i) Exemption of incremental FCNR(B)/NRE deposits with a maturity of three years and above from CRR/SLR requirements,

(ii) Exclusion of the incremental FCNR(B)/NRE deposits from adjusted net bank credit for computation of priority sector lending targets,

(iii) Liberalisation of FDI norms through review of limits and (or) shifting of selected sectors to the automatic route for FDI,

(iv) offering a window to banks to swap the fresh FCNR(B) dollar funds with the Reserve Bank (up to November 30, 2013),

(v) Increase in the overseas borrowing limit of banks from 50 to 100 per cent of the unimpaired Tier I capital (with the option of swap with the Reserve Bank),

(vi) Permission given to eligible borrowers to avail external commercial borrowings (ECB) under the approval route from their foreign equity holder company for general corporate purposes,

Measures to address pressure on the Exchange Rate

(i) Foreign exchange swap for public oil marketing companies (OMCs),

(ii) Expansion of bi-lateral currency swap arrangement with Japan.

Other Measures:

(i) Measures to rationalise gold imports

(ii) Increase in import duty on gold

A sum of USD 34 billion has been received under both the schemes (swap facility for FCNR (B) deposits and bank overseas borrowings) till closure of the scheme at end November 2013. Introduction of the foreign exchange swap for public OMCs contributed to the stability of the exchange rate. With volatility diminishing in the foreign exchange market, OMCs have been meeting all their daily dollar requirements through the market from the last week of November 2013. However, as indicated in the previous FSR, the need for augmenting long term capital inflows, particularly equity flows, remains important.

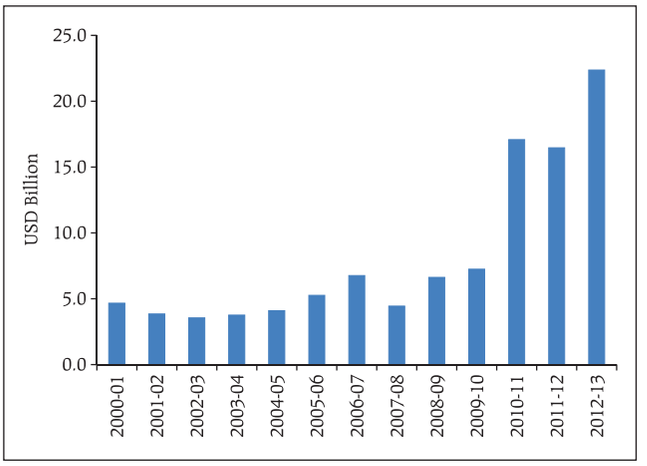
during Q1 2013-14 due to decline in the trade deficit. From July 2013 onwards exports have grown faster than imports. The CAD is expected to be less than 3 per cent of GDP during the current financial year. The increased resilience of the Indian financial markets is evidenced by the positive reaction to the announcement of the commencement of tapering from January 2014 by the Fed.

1.15 In recent years, there has been a significant rise in outflows of investment income in the current account (Chart 1.10). Such outflows include interest payments on commercial borrowings, Non-resident Indian (NRI) deposits and FII investment in debt securities as also outflows on account of FDI. Reliance on external debt for financing high CAD, deregulation of interest rate on NRI deposits and liberalisation of ECB norms have *inter alia* contributed to the rise in interest payment during this period. While attracting capital inflows to tide over the CAD appears attractive, the long term solution to India's external problems lies in increasing productivity and export competitiveness.

1.16 Boosting exports in an environment of low global growth could be challenging. However, the strategy of geographical diversification of India's trade towards Asian economies has been fruitful on this front (Chart 1.11). The focus on rationalising imports, by curtailing non-essential imports, has helped check the growth in CAD. On the positive side, the emerging geopolitics and increased availability of alternative energy sources such as shale gas can possibly have positive impact on the energy import bill.

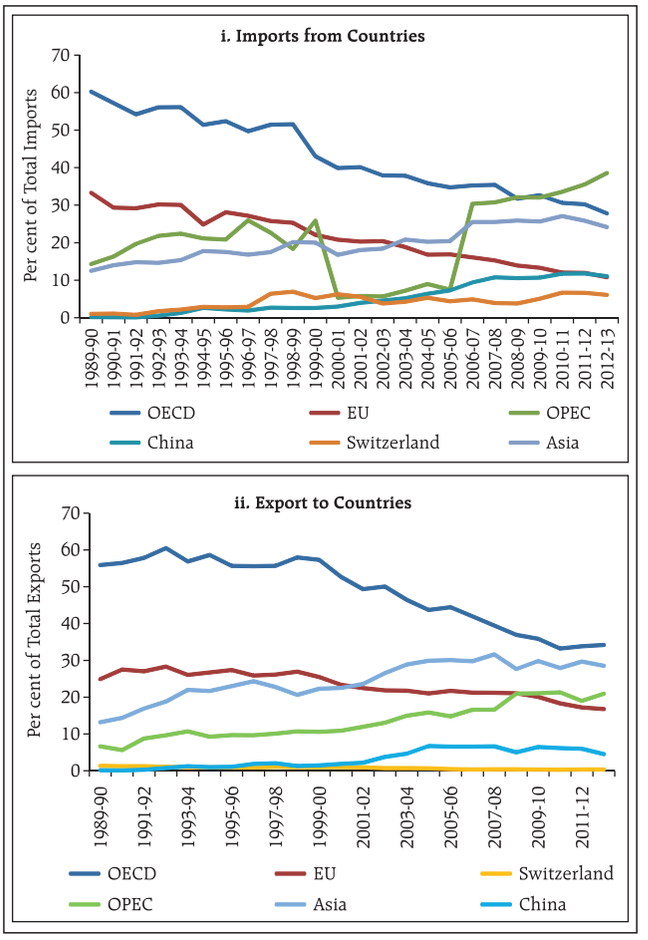
1.17 The enhanced currency swap arrangement with Japan for USD 50 billion provides an additional buffer to cushion any impact on the Indian rupee. The ratio of short term debt (original maturity) to total debt increased marginally (Table 1.1), but a large part of it being trade related credit is usually rolled over.

Chart 1.10: Outflows on account of inward investments



Source: RBI

Chart 1.11: Direction of India's Trade



Source: RBI

Further, bilateral trade with countries witnessing increasing trade surplus with India may also reduce the demand for dollars. Fall in gold imports during Q2 2013-14 augurs well for the current account balance. If gold is excluded from the import basket, it improves the import coverage ratio of reserves. On balance, India's external position appears to be manageable and reserves seem adequate.

1.18 Despite a record CAD and high average inflation (WPI and CPI) the rupee appreciated by about 2 per cent between Q2 2012-13 and Q3 2012-13 (average exchange rate during the quarter over average exchange rate during the previous quarter). Dynamics such as these could have influenced exchange rate movements after May 2013. In general, the Indian rupee has become more volatile after the global financial crises (Chart 1.12).

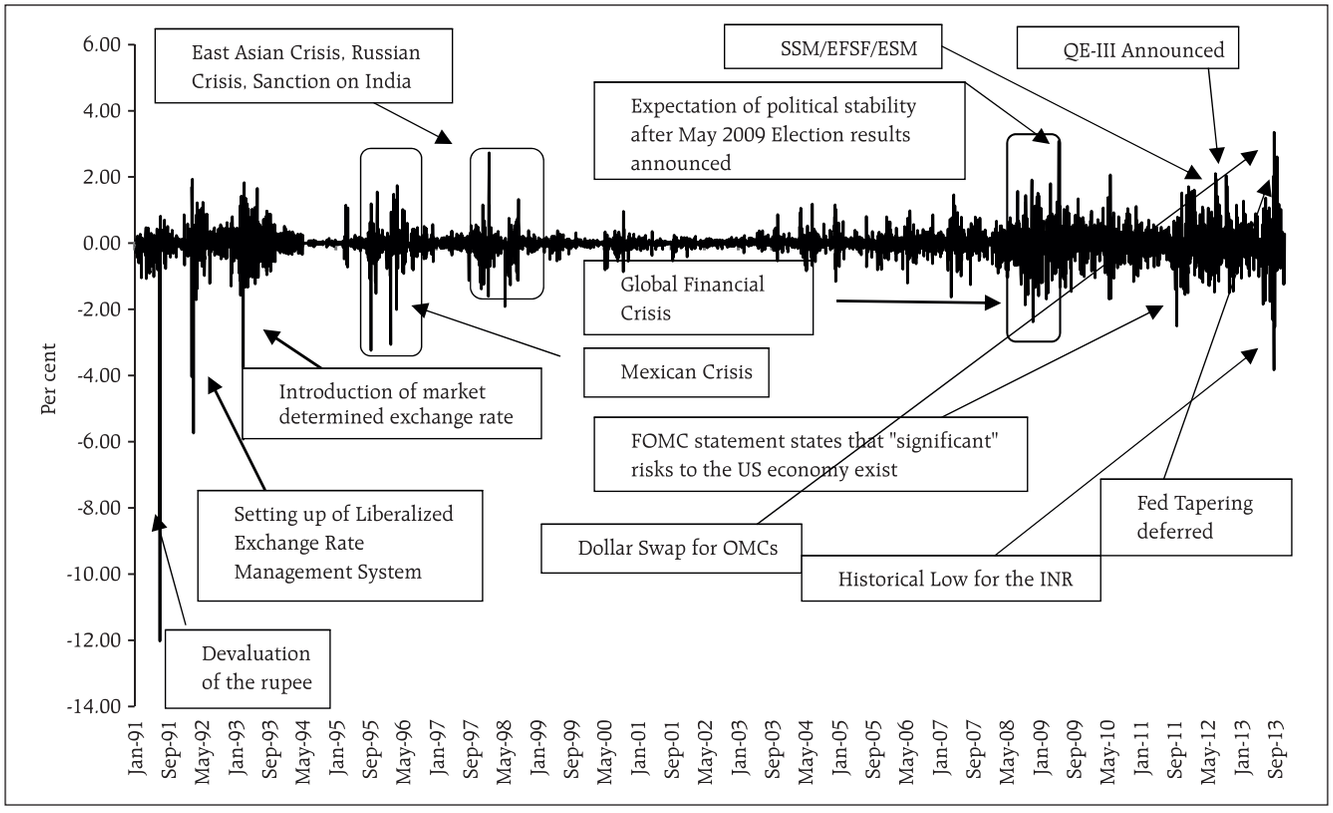
Table 1.1: External Sector Indicators

(Ratios in per cent)

Indicator	End-Mar 2012	End-Mar 2013	End-Jun 2013
1	2	3	4
1. Ratio of Total Debt to GDP	19.7	21.3	22.7
2. Ratio of Total Debt to GDP (ex NRI Deposits)	16.4	17.4	18.6
3. Ratio of Short-term to Total Debt (Original Maturity)	22.6	24.7	24.9
4. Ratio of Trade Related Credit to Short Term Debt (Original Maturity)	83.3	89.8	92.2
5. Ratio of Short Term Credit (ex Trade Related Credit) to Total Debt (Original Maturity)	3.8	2.5	1.9
6. Ratio of Short-term to Total Debt (Residual Maturity)#	42.7	44.2	43.8
7. Ratio of Short-term Debt to Reserves (Original Maturity)	26.6	33.1	34.3
8. Ratio of Short Term Debt (ex Trade Related Credit) to Reserves (Original Maturity)	4.4	3.4	2.7
9. Ratio of Short-term Debt to Reserves (Residual Maturity)#	50.1	59.0	60.2
10. Reserves Cover of Imports (in months)	7.1	7.0	6.7
11. Reserves Cover of Imports (in months) (ex Gold)	8.0	7.8	7.6
12. External Debt (US$ billion)	345.8	392.1	388.5

#: RBI Estimate.

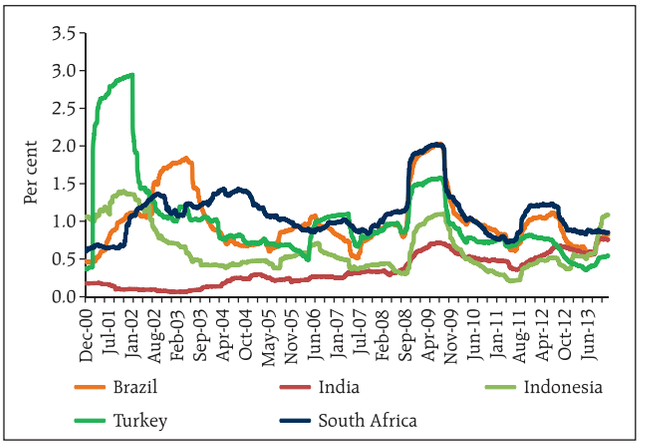
Chart 1.12: Daily Variation in the USD/INR Exchange Rate



Note: Positive values indicate appreciation of the INR and negative values depict depreciation
Source: Calculated using Bloomberg data

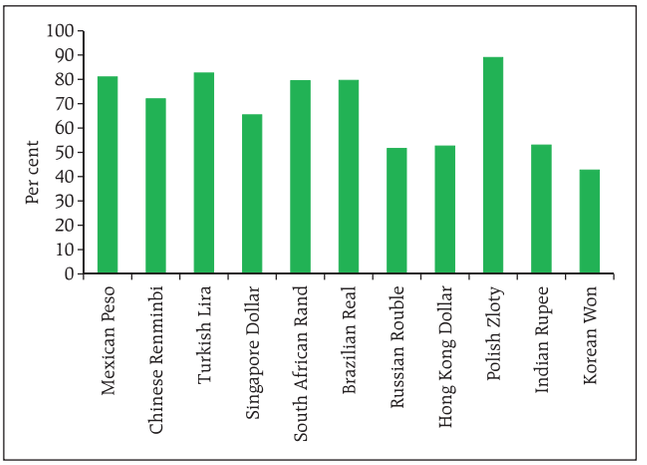
The INR has been, historically, relatively less volatile compared to some other emerging EMDE currencies (Chart 1.13). In general, there has been an increase in the offshore[2] turnover of emerging market currencies during the last few years. For instance according to the Bank of International Settlements (BIS) in the case of some emerging market currencies more than half of average daily turnover, during April 2013, emanated in the offshore market (Chart 1.14).

Chart 1.13: EMDE Currency Volatility



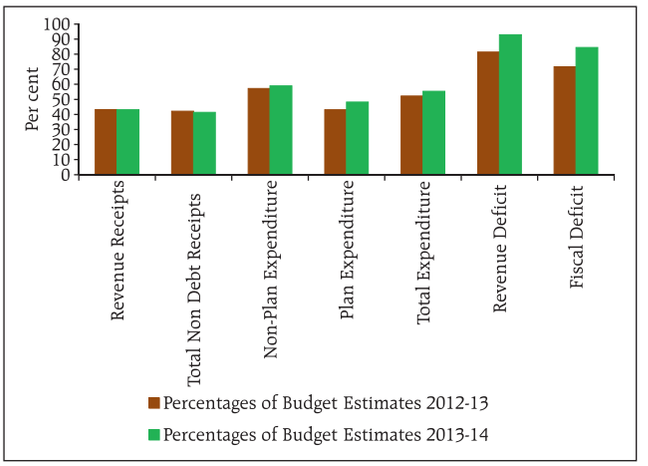
Note: Volatility refers to 250 day rolling standard deviation of daily variation in exchange rate against the USD. Data updated up to December 18, 2013
Source: Calculated using Bloomberg data

Chart 1.14: Share of Offshore turnover in total Turnover



Note: Adjusted for local and cross-border inter-dealer double-counting (*i.e.* "net-net" basis)
Source: BIS Quarterly Review, December 2013

Chart 1.15: Budgetary Position of the GOI: April-October



Source: Controller General of Accounts, Ministry of Finance, GoI

Fiscal Correction – Challenges

1.19 Key deficit indicators of the central government have widened significantly during the first seven months of 2013-14 in comparison to the corresponding period of the previous year (Chart 1.15). Higher plan spending and lower revenue mobilisation resulted in higher gross fiscal deficit (GFD) which was more than 84 per cent of the budget estimate during the first seven months of the current fiscal year.

1.20 The Government, in its Medium Term Fiscal Policy Statement, has stated that plan expenditure has to remain within affordable levels, at least till the process of fiscal consolidation is over. Hence, if the government has to meet its GFD target of 4.8 per cent of GDP, shortfall in receipts and the slippage in major subsidies could lead to a sharp cut back in the plan expenditure, thereby affecting the quality of fiscal adjustment in the near term.

1.21 Revisiting and adherence to the Fiscal Responsibility and Budget Management Act (FRBMA) may boost credibility of the government and improve confidence in the economy. Even from a financial market development perspective, lower government borrowing can go a long way in addressing many structural constraints inhibiting financial market development. To compensate for the reduced capacity of the State in financing desirable capital

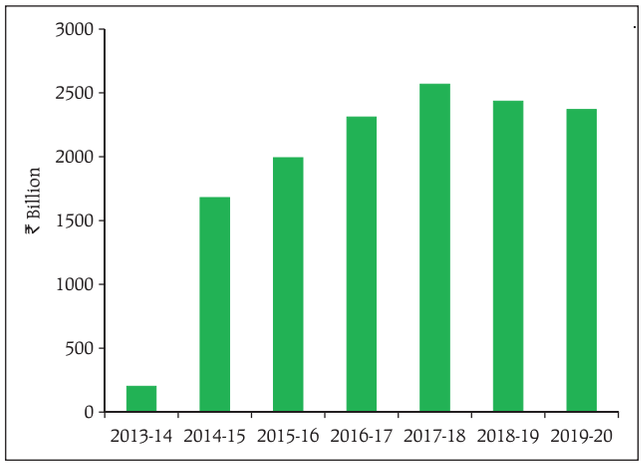
[2] Offshore trades refers to all trades executed outside the jurisdiction where a currency is issued

expenditure, private sector needs to be incentivised to fill the gap mainly through financial market development.

1.22 The average life to maturity of the outstanding GoI's dated securities at 9.67 years is quite elongated and thus, does not pose any significant rollover risk. Nonetheless, redemption pressure would increase significantly starting from 2014-15 to 2019-20 (Chart 1.16). The demand for long-dated government securities dwindled in the aftermath of the global financial crisis. Thus, a large portion of the government market borrowing programme during 2008-09 and 2009-10 was completed by issuing relatively short and medium-term securities which are maturing between 2014-15 and 2018-19.

1.23 The concern of elevated redemption, however, could be addressed by using buyback/ switches of G-Secs as part of the debt management strategy. These strategies are used extensively for liability management operations across advanced and several emerging market economies (EMEs). The Union Budget 2013-14 has provided ₹500 billion for buyback and switches and such operations are likely to be undertaken in the last quarter of this fiscal year. This will involve swapping short-term securities with long-term securities in order to reduce the redemption pressure for the maturity buckets from 2014-15 to 2018-19.

Chart 1.16: GoI Debt: Redemptions

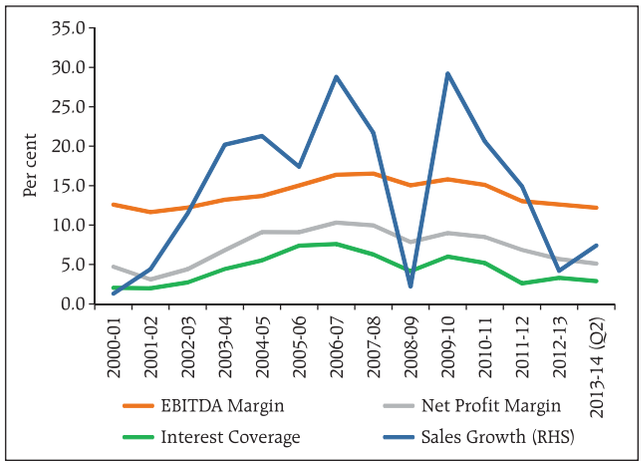


Note: Position as on December 9, 2013.
Source: RBI

Corporate Sector

1.24 Indian corporate sector witnessed relatively subdued performance during Q2 2013-14 as evidenced by continuing contraction in net profits and decline in net profit margin (Chart 1.17). Net profits contracted for the second succesive quarter of the current fiscal year even though sales growth increased. Profit margins of the listed non-government non-financial (NGNF) companies remained low since Q2FY12. Profit margin [EBITDA (earnings before interest, tax, depreciation and amortisation) to sales] improved marginally in Q1 2013-14 in comparison

Chart 1.17: Performance of the Corporate Sector



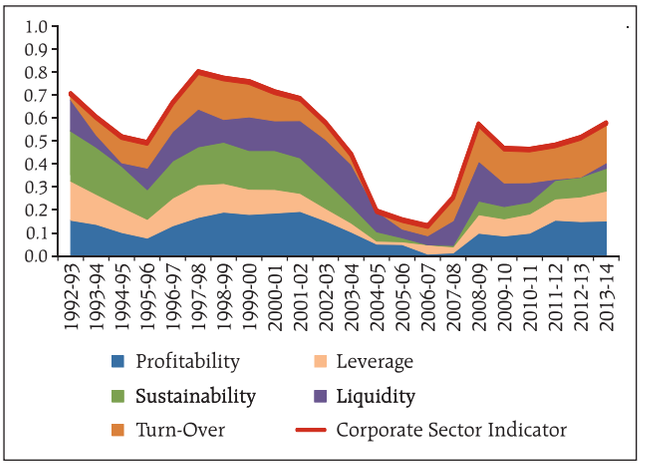
Note: Data pertain to listed Non-Government Non-Financial Companies. Sample of 2708 companies during Q2 2013-14.
Source: RBI

with the previous quarter but worsened during Q2 2013-14. Interest coverage ratio, measured by the ratio of EBIT (earnings before interest, tax) to interest payment, recorded a marginal improvement in Q2 2013-14.

1.25 The Corporate Sector Stability Indicator and Map[3] presents an overall assessment of changes in underlying conditions and risk factors affecting the stability of the corporate sector. The assessment is based on five dimensions, *viz.* leverage, liquidity, profitability, sustainability and turnover, during 1992-93 – 2012-13. Results suggest that between 1992-93 and 1995-96 stability of the corporate sector increased (Chart 1.18). Stability deteriorated due to stress in all five dimensions during 1995-96 to 1996-97. The corporate sector remained relatively stressed till 2001-02. Stability improved considerably during 2001-02 - 2007-08. Leverage increased towards the end of this period. Deterioration in all dimensions was witnessed during 2007-08 - 2008-09 with profitability and leverage contributing significantly to overall stress. After marginal improvement in 2009-10, stress increased again. Demand and efficiency factors contributed more towards increase in risks. Sustainability, leverage and profitability also contributed to stress. Though there is some improvement in profitability[4] towards the second half of 2012-13, other stability parameters deteriorated further (Chart 1.19).

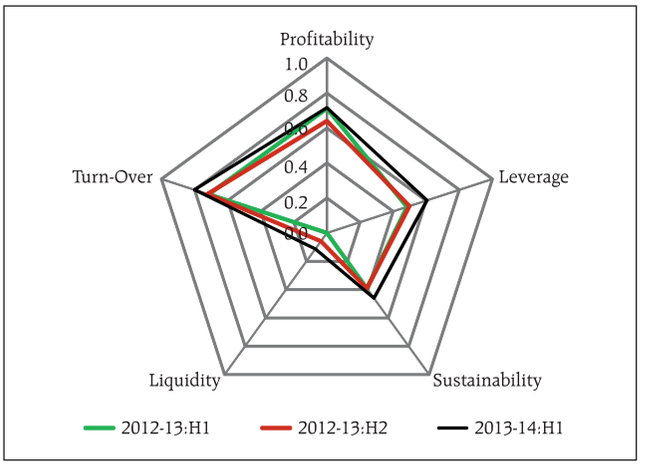
1.26 The performance of private corporate sector during the last few years has been a concern especially amid falling economic growth. Fall in investments

Chart 1.18: Corporate Sector Stability Indicator



Note: Increase in indicator value shows lower stability. The area for each dimension signifies its contribution towards risk
Source: Corporate Balance Sheets and RBI staff calculations

Chart 1.19: Corporate Sector Stability Map



Note: Away from the centre shows increase in risk
Source: Corporate Balance Sheets and RBI staff calculations

[3] The five composite indices represent the five dimensions of leverage, liquidity, profitability, sustainability and turnover. Each index, representing an aspect of corporate functioning, takes a value between zero (minimum) and 1 (maximum). Each index is a relative measure during the sample period used for its construction, where a high value implies high risk in that dimension. Therefore, an increase in the value of the index in any particular dimension indicates an increase in risk in that dimension for that period as compared to other periods.

A number of ratio-variables are used for each dimension. Each ratio-variable is standardised for the sample period by first converting into a standard normal-variate and then using relative distance method. A composite measure of each dimension is calculated as a simple average of standardised ratios used for that dimension. The overall corporate sector stability indicator is derived as a weighted average of indices of chosen five dimensions, where the weights are derived using principal component analysis. Annual corporate balance sheet data for about 3000 companies have been used. See Annex-2 for detailed methodology.

[4] Half-yearly balance sheet data of large corporates have been used for 2011-12:H1, 2012-13:H1, 2012-13:H2 and 2013-14:H1.

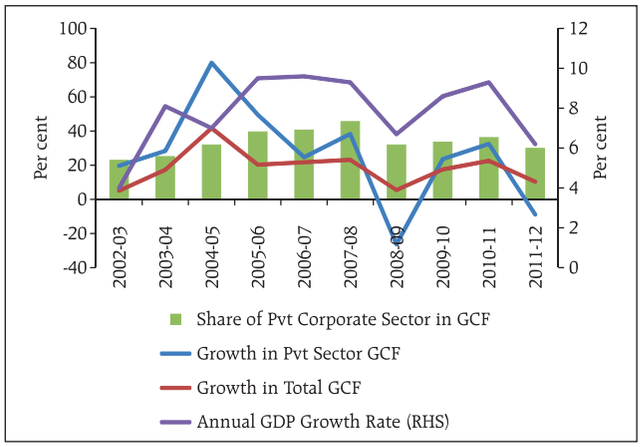
(ratio of gross capital formation to GDP) from 38 per cent in 2007-08 to 35 per cent in 2011-12 is one of the important factors behind slowing growth in the industrial sector. While the global slowdown played an important role, growth in the Indian private sector investments (gross capital formation) had started falling during the years preceding the onset of global financial crisis (Chart 1.20).

1.27 Asset composition of corporates underwent a change during the last two decades. An analysis based on the data[5] for a sample of common companies for the period 1999-91 to 2011-12, brings out a clear shift towards increasing share of financial investments in total assets, even as the incremental investment in fixed capital assets like plant and machinery has been slowing[6]. The contribution of gross fixed assets to the total assets which stood at 74.2 per cent during 2002-03 gradually declined to 52.6 per cent during 2011-12. During this period, financial investment of the corporates increased to 19.8 per cent of total assets during 2011-12 from 12.4 per cent in 2002-03 (Chart 1.21). This rise in the share of investment to total assets was mainly due to the increasing contribution of investments in the 'shares and debentures of subsidiaries' and 'securities of financial institutions'. The 'cash and bank balances' of corporates, which include the 'fixed deposits with banks', have also risen during the period under analysis.

Equity and Debt Markets

1.28 Subsequent to the Fed's mid-June 2013 tapering announcement, foreign institutional investors (FIIs) withdrew from the Indian equity and bond markets, but returned as net buyers to the equity market in September 2013, though they were net sellers in the bond market till November 2013 (Chart 1.22). While the actions of domestic and foreign institutions are

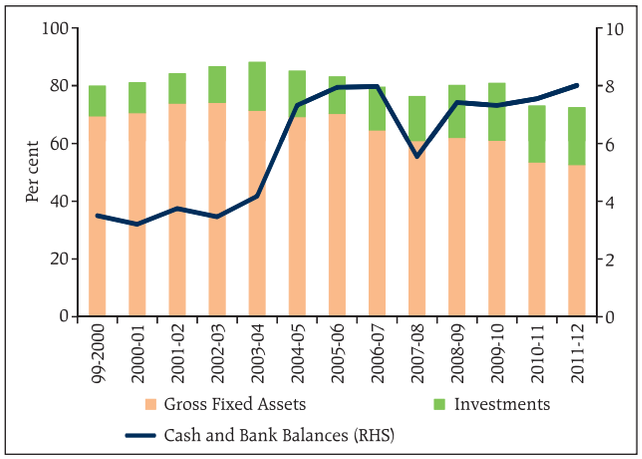
Chart 1.20: Annual Growth in Gross Capital Formation in Private Corporate Sector[7]



Source: RBI

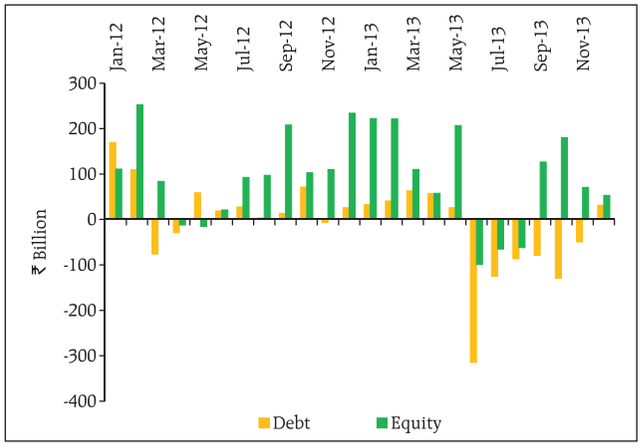
Chart 1.21: Trends in Asset Composition of Corporate Sector

(Per cent of Total Assets)



Source: RBI

Chart 1.22: FII Net Investment in the Equity and Bond Market



Note: Data updated up to December 17, 2013
Source: SEBI

[5] This analysis is based on common sample of 765 Non-Government Non-Financial Public Limited Companies

[6] Also see Chandak, B.L (2013), "Present Economic Crisis Due to Overplaying of Corporate Sector Investment?", *The Indian Banker*, October

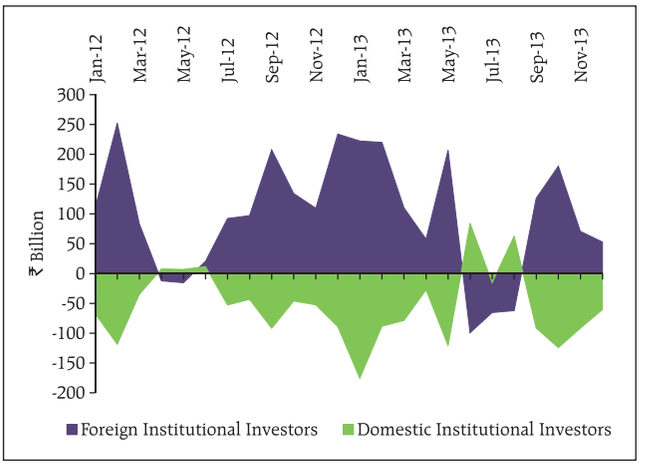
[7] GCF Figures at Current market Prices with 2004-05 as base year. GDP figures at factor cost at constant market prices

counterbalancing, the dominance of foreign institutions prevails (Chart 1.23). Between September 2007 and September 2013, FII ownership of the BSE Sensex and the NSE Nifty ranged between 14 per cent – 30 per cent showing a downward trend in the wake of the financial crisis (Chart 1.24). FII holding of index stocks began increasing from March 2009 possibly on the back of easy monetary policy in the AEs, among other factors. However, FII holdings fell after June 2013 on concerns about tapering in QE. The reaction of the Indian equity markets to the recent announcement of tapering of QE has been largely positive suggesting that markets had factored-in the tapering.

1.29 Holding of Indian bonds (government bonds and corporate bonds) by FIIs have fallen from around ₹1,901 billion as at end March 2013 to around ₹1,261 billion as on December18, 2013[8]. Thus, risk from large outflows from the bond market have are relatively low. With increased volatility in domestic financial markets after May 2013, the upfront margin prescribed as part of the risk management framework, in the equity cash and derivatives market and currency derivatives segment, was adequate to cover the price movements/volatility on each of the days during April-September 2013 *i.e.* there was no violation of margin calls.

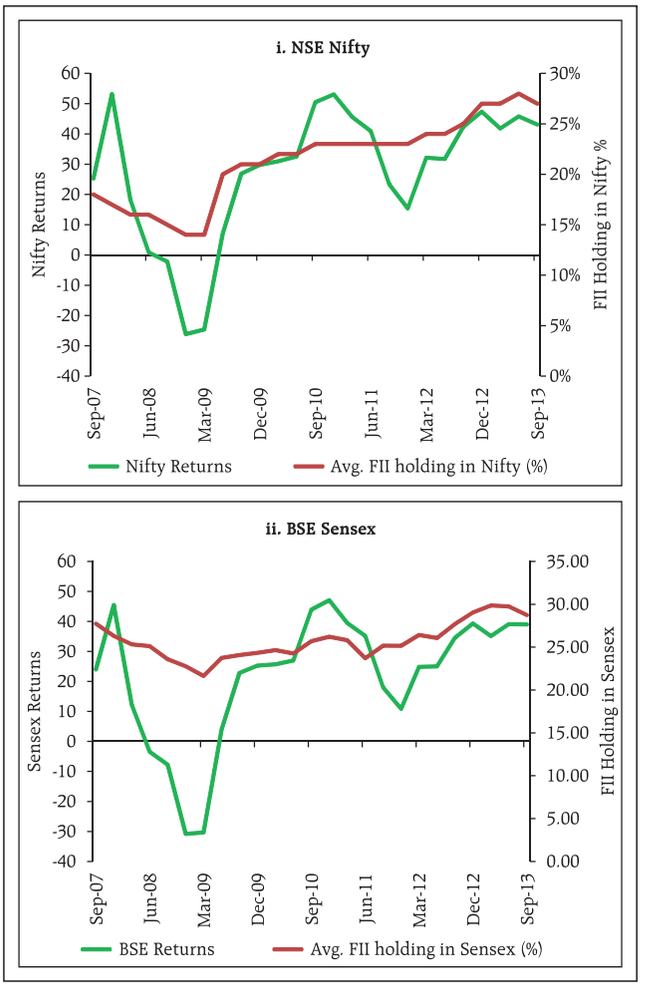
1.30 Consequent to policy measures initiated by the Reserve Bank to address volatility in the foreign exchange market, the overnight money market rates increased temporarily in line with policy intent and were largely anchored around the Marginal Standing Facility (MSF). Reacting to the tightening measures, yield on short term government securities hardened considerably, which got transmitted across the term structure for a short duration and also increased volatility. Pressures on yields also arose as domestic inflation firmed up and the market priced-in increased probability of global interest rate hardening.

Chart 1.23: FIIs and DIIs in the Indian Equity Market



Note: Data are provisional and updated up to December 17, 2013
Source: SEBI and BSE

Chart 1.24: FII Ownership of Index Stocks



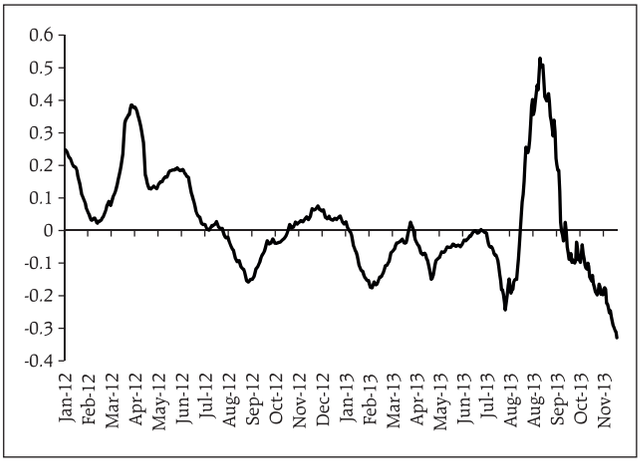
Source: SEBI

[8] SEBI and NSDL

Hardening yields resulted in decline in net asset value (NAV) of debt schemes, resulting in substantial redemption pressure for the mutual funds. Banks' investments as a percentage of total assets under management (AUM) of liquid/money market scheme also declined significantly during the period July 15 - July 31, 2013. As stability returned to the foreign exchange market, the Reserve Bank normalised the exceptional liquidity and monetary measures in a calibrated manner and completed this process by October 2013. *Ceteris paribus*, this action had a softening impact on bond yields.

1.31 Notwithstanding steep increase in G-Sec yields after policy measures announced in July 2013, the weighted average cost of GoI's borrowing through nominal dated securities during 2013-14 (up to December 6) remained marginally lower than that during 2012-13 as yields had moderated significantly in the first quarter of 2013-14. With reduction in the MSF rates from September 20, 2013 onwards G-Sec yields started moderating from their elevated levels and volatility also started declining. In addition, systemic liquidity as measured by the systemic liquidity indicator (SLI), began improving from early September 2013 and was comfortable from early October 2013 onwards (Chart 1.25).

Chart 1.25: Systemic Liquidity Indicator

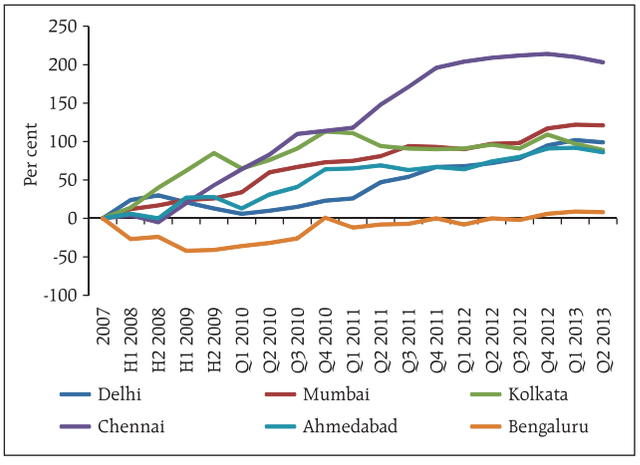


Note: The SLI below zero denotes comfortable level of liquidity conditions in the system, whereas level above zero implies tight liquidity conditions. Updated up to December 13, 2013
Source: RBI Staff Calculations

House Prices

1.32 House prices in some major Indian cities have registered extremely high growth between 2007 and Q2 2013 with some cities registering a doubling of prices during this relatively short time period (Chart 1.26). However, during Q2 2013, house prices in some cities fell while in other cities the growth in house prices moderated. About two-fifth of credit available for retail housing is accounted for by housing finance companies (HFCs). Outstanding loans for housing by HFCs have grown relatively faster than outstanding retail housing loans by scheduled

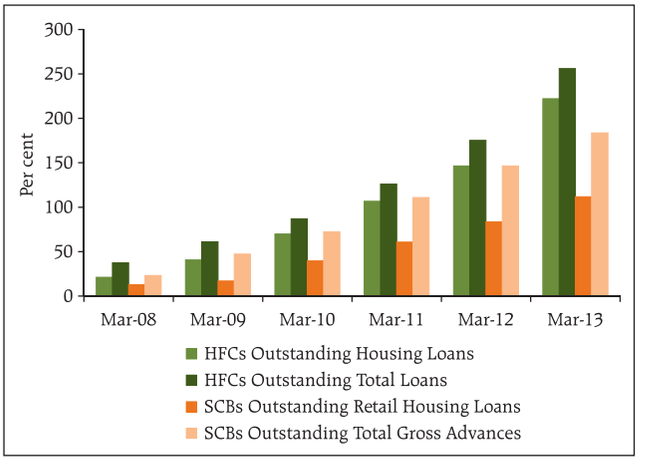
Chart 1.26: Change in House Price



Source: Calculated using NHB Data

commercial banks (SCBs) and have doubled in four years from 2007 (Chart 1.27).

Chart 1.27: Growth in Finance to the Housing Sector
(Base = March 2007)



Source: Calculated using NHB and RBI Supervisory Returns data

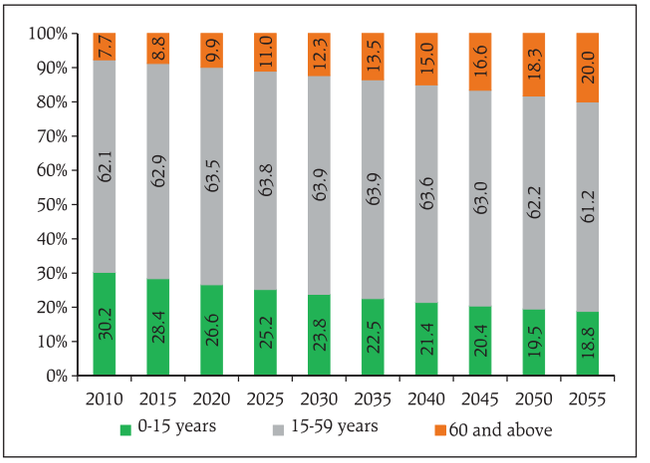
Informal Sector and Wealth Effects

1.34 The increasing relevance of the informal sector and wealth effects of increasing asset prices in the Indian economy, which have grown in significance especially after the initial set of financial sector reforms in the 1990s, can hardly be over-emphasised. However, information on these aspects is scarce. It is imperative to construct robust datasets pertaining to the informal sector from a policy making and developmental planning perspective, while data on wealth effects will be useful mainly to assess the impact on consumption patterns. The Report of the Committee on Unorganised Sector Statistics 2012 recognised that it was important to include and build comprehensive database on various aspects of the informal economy as part of the national statistical system. To achieve this end, several recommendations have been made to improve information on informal sector employment and enterprises among other aspects. Effect of changes in employment and income in the informal sector on consumption and GDP can be tracked and better policy responses can be devised if robust information about this sector is present.

Pension System

1.35 India's pension system for the informal sector is equipped inadequately to handle the rapid ageing, which will pan out in the next few decades. The share of elderly in the population has increased from 5.6 per cent in 1961 to 7.4 per cent in 2001 and is projected to rise to 12.4 per cent by 2026[9] (Chart 1.28). The absolute numbers will double from 77 million in 2001 to 143 million by 2021[10]. With rising life expectancy and declining fertility, the demographic window of opportunity will close soon and the small cohort of children born during this time will find

Chart 1.28: Demographic Projections for India



Source: United Nations, Department of Economic and Social Affairs, Population Division, Population Estimates and Projection Section

[9] Situation Analysis Of The Elderly in India, Central Statistics Office, Ministry of Statistics & Programme Implementation, Government of India, June 2011

[10] Situation Analysis Of The Elderly in India, Central Statistics Office, Ministry of Statistics & Programme Implementation, Government of India, June 2011.

themselves supporting a large cohort of elderly parents. Besides, this demographic transition occurred in the developed world at higher income levels, while the challenge for India in addressing the coverage gap is compounded by fiscal constraints and the un-affordability of an adequate level of public expenditure for pensions.

1.36 India's high growth rates in the past two decades have been accompanied by the disturbing trend of increasing informalisation. The informal/ unorganised sector constitutes more than 90 per cent of the workforce and accounts for 50 per cent of the GDP. Tenuous labour market attachment, intermittent incomes, poor access to social security renders the unorganized workers highly vulnerable to economic shocks during their productive years. Coupled with breakdown in traditional family support structures, migration, urbanization and no/inadequate retirement savings the unorganized workers will inevitably face old age poverty and fall back on the tax financed old age pensions like National Social Assistance Programmes (NSAP). The pension schemes under NSAP offer benefits that are below subsistence levels at ₹200 per month and cater only to the BPL (also see Box 1.2). The recently released Mihir Shah Committee recommendations on pension schemes under NSAP translate to a 12th Plan expenditure exceeding ₹1,000 billion a figure which appears to be fiscally unsustainable.

1.37 A mono pillar pension system design for 90 per cent unorganized sector workers, consisting only of defined benefit schemes, as is the case today, will have

Box 1.2: Planning a Pension System for the Informal Sector

Even today the pension budgets, which contain significant expenditure for the old, for states like Bihar, Orissa, Uttar Pradesh and West Bengal account for more than 25 per cent of their revenues. The situation in the North Eastern states is worse with pension budgets accounting for over 50 per cent of revenues in four states of which Nagaland's expenditure on pensions is more than 135 per cent of its own revenues. The present central and state government budget on pensions exceeds ₹1,600 billion (BE for 2012-13). It is worth noting that these budgets pertain to the retirees amongst the civil servants who constitute a small percentage of the population. Considering the current budget estimations and commitment towards the pension obligations, a continuous launch of numerous Defined Benefit (DB) schemes with lack of liability computation may prove to be fiscally challenging in an era of increasing life expectancy.

The GoI approved on 23rd August 2003 the proposal to implement the budget announcement of 2003-04 relating to introducing a new restructured defined contribution pension system for new entrants to Central Government service, except to Armed Forces, in the first stage, replacing the existing system of defined benefit pension system. The new system was also to be available, on a voluntary basis, to all persons including self employed professionals and others in the unorganised sector. The National Pension System (NPS) was, therefore, created to serve both the Government employees and the private sector workers. While the absence of a country-wide social security system (formal pension coverage being about 12 per cent of the working population), the ageing and social change were important considerations for introducing pension reform in the unorganised sector, fiscal stress of the defined benefit pension system was the major factor driving pension reforms for employees in the organised public sector (Government employees). This had been designed to make a shift from defined-benefit to defined-contribution, putting a cap on government's liability towards civil servants' pension, in line with the international practices and the realization of upcoming fiscal stress of pay-as-you-go system.

budgetary allocations spiralling out of control and crowd out development expenditure like infrastructure investments and welfare expenditure on health and education. There is growing unanimity that single pillar pension systems (dependent only on tax financed pensions) are unable to address the various risks associated with population ageing. A system design based on multiple pillars which take into account the initial conditions and specific context of the country is better suited to providing protection to the elderly. Pursuant to the passing of the Pension Fund Regulatory and Development Authority Bill, 2013 (PFRDA Bill, 2013) by Parliament in September, 2013, the challenge in further development of the pension sector include aggressively covering the unorganised sector, which accounts for the substantial part of the total labour force and which has no formal pension provision, under NPS, and improvement in the financial literacy levels to educate the subscribers to take appropriate investment decisions based on their risk and return profile so that their pension wealth under NPS could be maximised. The PFRDA Bill, 2013 seeks to vest PFRDA with statutory status in order to help PFRDA perform its regulatory and developmental roles effectively. It is expected that the success of pension reforms will not only help in facilitating the flow of long-term savings for economic development, but would also help establish a credible and financially sustainable social security system in the country.

Chapter II

Financial Institutions: Soundness and Resilience

The Banking Stability Indicator shows that risks to the banking sector have increased since the publication of the last FSR in June 2013. Banking Stability Measures, based on co-movements in banks' equity prices, indicate that the distress dependencies within the banking system have started rising. Network analysis has been used to measure the impact of contagion in the interconnected banking system to the failure of a major corporate and a major corporate group.

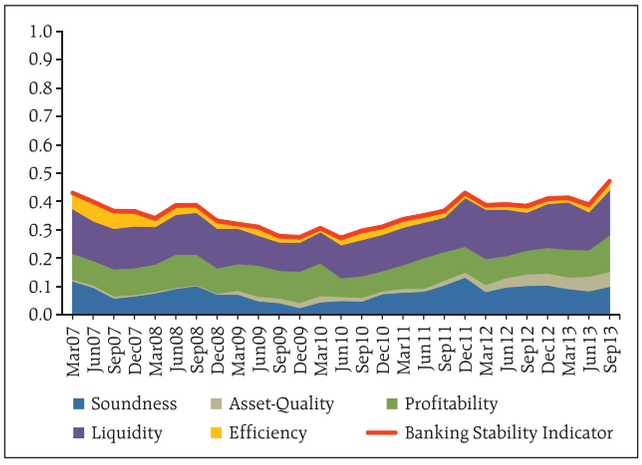
The strain on asset quality continues to be a major concern. A few sectors, namely, Infrastructure, Iron & Steel, Aviation, Textiles and Mining continue to contribute significantly to the problem assets of the banking sector, while the performance of the retail sector has been good. Some factors affecting the asset quality adversely are current economic slowdown – global and domestic, persistent policy logjams, delayed clearances of various projects, aggressive expansion by corporates during the boom phase with resultant excess capacities, deficiencies in credit appraisal, etc. Reserve Bank has recently issued a discussion paper to address the issue of stressed assets.

Macro stress tests indicate that if the adverse macroeconomic conditions persist, the credit quality of commercial banks could deteriorate further. However, under improved conditions, the present trend in credit quality may reverse during the second half of 2014-15. The present level of provisions of SCBs may not be sufficient to meet the expected losses under heightened adverse macroeconomic conditions.

Banking Sector Risks

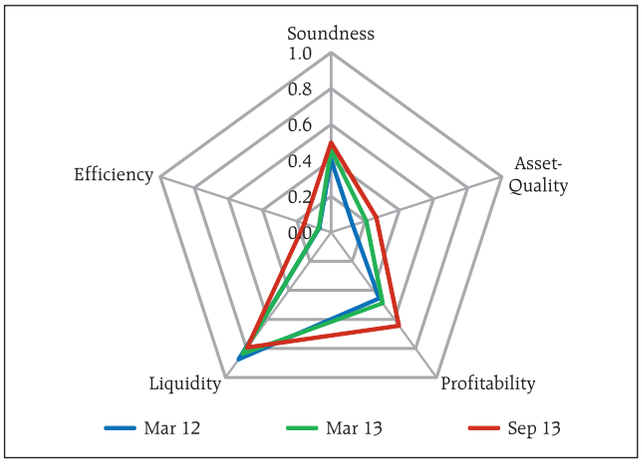
2.1 The risks to the banking sector, as at end September 2013 have increased since the publication of the previous FSR[1]. The Banking Stability Indicator (BSI), which combines the impact on all major risk dimensions, shows an increase in vulnerability in the banking sector since September 2010 (Chart 2.1 & 2.2).

Chart 2.1: Banking Stability Indicator



Increase in indicator value shows lower stability. The area for each dimension signifies its contribution towards risk.
Source: RBI Supervisory Returns and Staff Calculations.

Chart 2.2: Banking Stability Map



Away from the centre signifies increase in risk.

[1] FSR – June 2013 - with reference to data as at end March 2013.

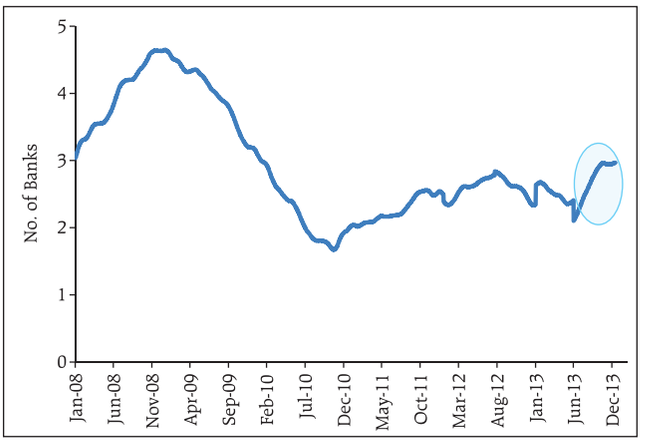
Distress Dependencies and Interconnectedness

Banking Stability Measures (BSMs)[2] – Distress Dependency Analysis

Common Distress in the System-Banking Stability Index

2.2 The Banking Stability Index (BSI), which measures the expected number of banks that could become distressed given that at least one bank becomes distressed, has risen sharply since August 2013. The BSI takes into account individual bank's probabilities of distress besides embedding banks' distress dependency. Therefore, the indicator exhibits larger and nonlinear increases than the Probabilities of Distress (PoDs)[3] of individual banks. The BSI depicted a rising trend beginning September 2010, moderated during the first half of 2013 and again reversed the trend in August 2013 indicating escalation in common distress in the banking system (Chart 2.3).

Chart 2.3: Movements of BSI

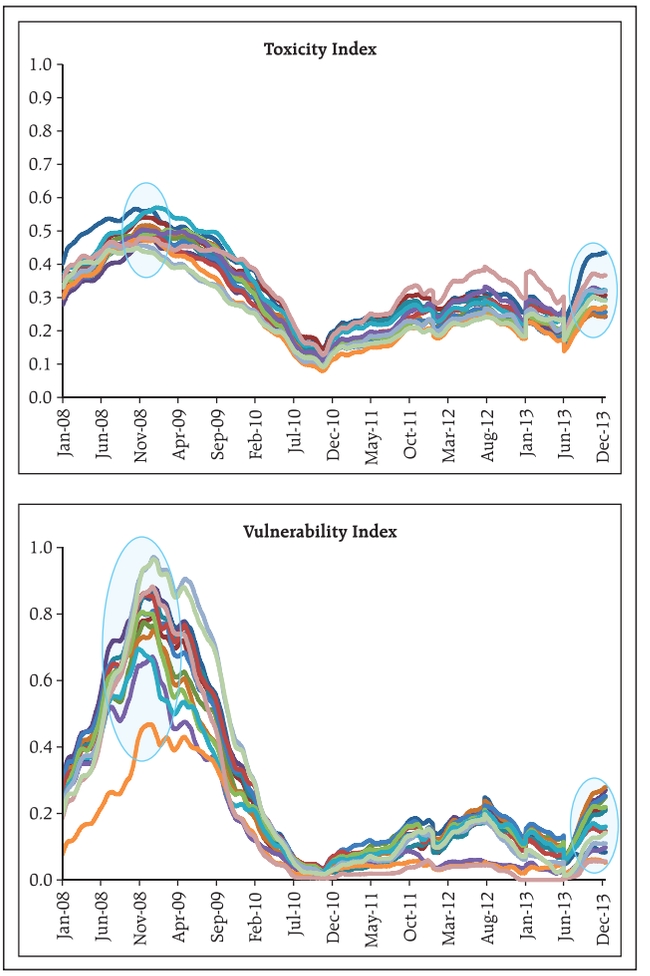


Source: Bloomberg Data and RBI Staff Calculations.

Distress Relationship Among Banks

2.3 Both the toxicity as well as vulnerability indices (TI and VI) have shown a co-movement with that of BSI indicating signs of rising toxicity and vulnerability of the selected banks. Further, the spread among the banks' VI during its current upward trend is lower than the spread observed during the financial crisis, indicating that rise in the vulnerability of SCBs has become more broad-based. The vulnerability levels are however significantly lower than the levels observed during the crisis. Further, the spread in the banks' toxicity indices during the current period is more divergent than the spread observed during the financial crisis, indicating that the degree of the toxic behaviour of banks, *i.e.* the capacity to transmit the distress to other banks has diverged (Chart 2.4).

Chart 2.4: Distress Between Specific Banks



Note: Both the charts contain 15 lines which show the toxicity and vulnerability of the selected 15 banks.
Source: Bloomberg Data and RBI Staff Calculations

[2] Study is based on the equity prices of 15 major banks. These banks represent about 60 per cent of total assets of scheduled commercial banks in India. This model for Indian banking system has been developed by Mr. Miguel A. Segoviano, in collaboration with the Reserve Bank. Details are given in the Annex-2.

[3] The PoDs for banks were estimated from their equity return distributions. Under this approach, first, banks' historical distributions of equity returns are estimated. Then, the probability of returns falling under the historical worse 1 per cent of the cases (99 VaR) is quantified. Therefore, the PoD of a specific bank represents the probability that the bank's equity return would fall in the tail region (historical one percentile).

Interconnectedness

Contagion Risks in the Indian Banking Sector

2.4 The network tools[4] had been used earlier to measure the degree of interconnectedness and also assess the effects of contagion in case of failure of major lending and borrowing banks in the interbank system. In this issue of the FSR, network tools are being used to assess impact of contagion in a stressed scenario. The failure of a major corporate or a major corporate group could also trigger a contagion in the banking system due to the exposures of a large number of banks to the corporate.

Contagion Impact of Credit and Interest Rate Shocks

2.5 The network analysis in previous FSRs considered the failure of a bank as a random event and measured the contagion impact. The current analysis captures contagion effects under different conditions – stressed credit and interest rate scenarios. These stressed conditions lead to losses in capital due to additional provisioning requirements. If, in the case of one or more banks, the loss is large enough to cause distress to the bank/s[5], there will be further losses due to the contagion caused by the distressed bank / banks. Depending on the importance of the distressed bank /banks in the network, the contagion losses may be substantial. The total loss to the banking system due to the stressed conditions will then be the combined impact of (a) the loss caused by the stressed conditions[6], and (b) the resultant contagion losses due to distress in one or more banks as a result of the stressed credit or interest rate environment.

2.6 The analysis shows that the total loss to the banking system after taking into account contagion losses could significantly exceed losses due to the direct impact of the stressed conditions alone (Table 2.1). These risks will need to be taken into

Table 2.1: Loss to the Banking System under Different Stress Scenarios-September 2013

(Per cent of total capital)

	Initial Loss	Additional Losses Due to Contagion	Total Loss
Credit Shocks			
NPAs increase by 100 per cent	14.3	26.8	40.1
30 per cent restructured standard advances become NPAs (sub-standard)	2.9	0.0	2.9
30 per cent restructured standard advances are written off	10.7	24.1	34.8
Interest Rate Shocks (Trading Book)			
Parallel upward shift of INR yield curve by 250 bps	4.7	0.0	4.7
Steepening of the INR yield curve (0 to 100 bps linear in 0 to 15 years bucket)	0.6	0.0	0.6
Inversion of the INR yield curve#	3.1	0.0	3.1
Interest Rate Shocks (Banking Book)*			
Parallel upward shift of INR yield curve by 250 bps	21.0	32.6	53.6
Steepening of the INR yield curve (0 to 100 bps linear in 0 to 15 years bucket)	2.9	1.1	4.0
Inversion of the INR yield curve#	12.9	29.5	42.4

*: Banking Book was assumed to be marked-to-market.
#: Shocks of 250 bps, 100 bps, -50 bps and -100 bps for maturity buckets upto 1 year, 1-3 years, 3-5 years and 5 years & more, respectively.
Source: RBI Staff Calculations

[4] The network model used in the analysis has been developed in the Reserve Bank in collaboration with Professor Sheri Markose (University of Essex) and Dr. Simone Giansante (Bath University). Details are given in the Annex-2.

[5] For the purpose of this analysis, a bank is considered to be distressed if its core capital adequacy ratio falls below 6 per cent. It may be noted that this is a stringent failure condition considered for the purpose of stress testing the system. The net receivables have been considered as loss for the receiving bank.

[6] Details of credit and interest rate risks are discussed under 'Sensitivity Analysis - Top-Down Stress Tests - Bank Level' (Paragraph 2.56) .

cognisance while assessing the impact of credit and interest rate shocks on the banking system.

Solvency Contagion in the Interbank Market

2.7 The Indian government holds majority share (over 51 per cent) in case of public sector banks (PSBs). An analysis of contagion losses arising from the failure of major borrower in the system under the assumption that PSBs may not be allowed to fail shows that the losses are much lower than when PSBs are assumed to fail with the same probability as other banks (Table 2.2).

Table 2.2: Solvency Contagion Triggered by Top 5 Net Borrowers in the Interbank Market

Trigger Bank	Percentage loss of Tier I capital of the banking system assuming all banks have the same probability of failure	Percentage loss of Tier I capital of the banking system assuming that PSBs will not fail
A	12.2	6.1
B	9.5	5.2
C	2.7	2.3
D	2.2	2.2
E	2.3	2.3

Source: RBI Staff Calculations

Contagion Losses - Credit Concentration

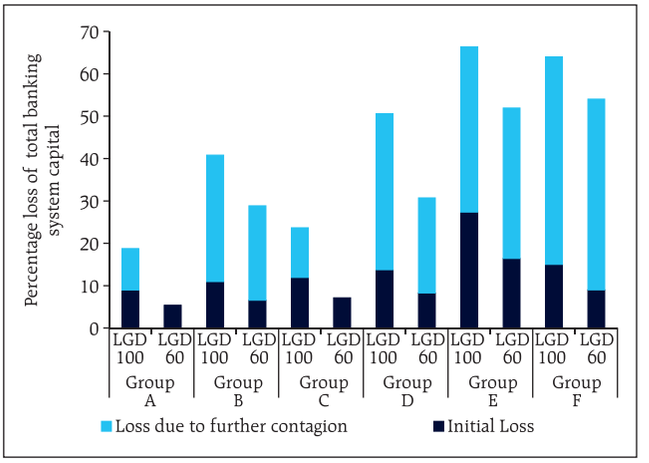
2.8 The performance of the corporate sector in the current economic scenario has been a matter of concern. The impact of deterioration in the health of corporate borrowers on the asset quality of the banking system has been discussed elsewhere in this report. Here, an attempt has been made to assess how default by a large corporate borrower or a corporate group triggers contagion risks in the interbank system.

2.9 The failure of a corporate borrower / borrower group causes a direct loss to the banking system to the extent of the banking system's exposure to the corporate borrower / borrower group. The extent of failure varies depending on the degree of the loss given default of the corporate borrower / borrower group.

2.10 The total loss to the banking system from the failure of the corporate / group will typically be distributed across banks in proportion to their individual exposures to the corporate /group. If, in the case of one or more banks, the loss is large enough to cause distress to the bank, then there will be further losses to the banking system due to the contagion caused by the distressed bank / banks. Depending on the importance of the distressed bank /banks in the network of interbank exposures, the contagion losses may be substantial.

2.11 The analysis here attempts to assess the impact of direct and contagion losses to the banking system due to the failure of a large corporate group or individual corporate borrower. The analysis is based on two scenarios – a loss given default (LGD) of 100 per cent and 60 per cent.

Chart 2.5: Impact of the Failure of a Borrower Group



Source: RBI Staff Calculations

2.12 The above analysis shows that in several cases, the contagion losses are significant and could exceed the direct losses caused by the failure of the corporate/ group.

2.13 The aforesaid stress scenario indicates that the failure of a large corporate group could result in a total loss of over 60 per cent of the banking system's capital (when the LGD is 100 per cent) and over 50 per cent of the banking system's capital (when the LGD is 60 per cent) (Chart 2.5). The loss could be at 14 per cent

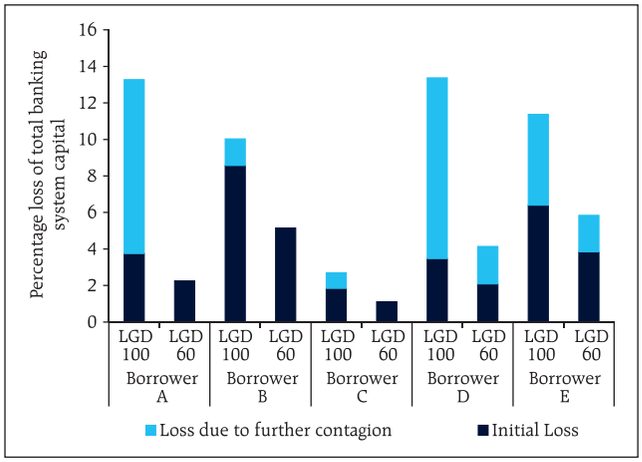
and 6 per cent in case of the failure of a large corporate borrower taking LGD as 100 per cent and 60 per cent, respectively (Chart 2.6).

2.14 Such risks posed by a large corporate or corporate group are sought to be minimised by large exposure limits prescribed by regulators. In the Indian context, a bank's exposure to a single borrower can go up to 25 per cent of the bank's total capital while its group exposure limit can go up to 55 per cent of its total capital[7].

2.15 These exposure norms have evolved in the context of the country's growth and development requirements, but are on the higher side by international standards. The Financial Sector Assessment Programme (FSAP) of India, conducted during 2011-12 by the IMF and World Bank, had assessed India to be "materially non-compliant" vis-à-vis the Basel Core Principle 10 related to "Large exposure limits". The FSAP report commented that "the large exposure limit of 40 percent - which can exceptionally be brought to 50 percent for infrastructure exposures - for a group borrower, is significantly higher than the large exposure limits of 25 percent which is considered good international practice ….. this limit has the potential to allow the default of one particular consolidated borrower to cause a serious loss of capital in a banking company".

2.16 A recent Basel Committee consultative document on "Supervisory Framework for Measuring and Controlling Large Exposures - Consultative Document", published in March 2013 has also proposed that the threshold defining large exposure should be set at 5 per cent of a bank's eligible capital base and that the large exposure limit may be fixed at 25 per cent of the Common Equity Tier 1 (CET1) or Tier 1 capital (as against the currently used total capital).

Chart 2.6: Impact of the Failure of a Corporate Borrower



Source: RBI Staff Calculations

2.17 In the light of the above analysis, and international best practices, a review of the extant single and group borrower exposure limits would considerably enhance the stability of the banking sector.

Joint Solvency-Liquidity Contagion

2.18 The above contagion analyses were based on the impact of the failure of a bank on its lenders, *i.e.* the risks arising from a solvency contagion. In the event of a failure of a bank, however, both solvency (triggered by a net borrower bank) and liquidity (triggered by a net lender bank) shocks are likely to emanate. An estimate of such risks was made by an extension of the network technique to develop a joint solvency- liquidity contagion model[8]. A flowchart

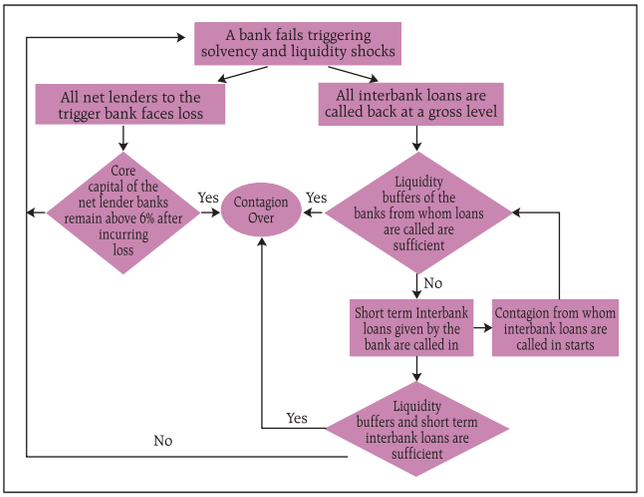
[7] RBI Master Circular on Large Exposures, July 01, 2013 (http://www.rbi.org.in/scripts/BS_ViewMasCirculardetails.aspx?id=8130)

[8] A bank typically has both positive and negative net lending positions against other banks. In the event of failure of such a bank, both solvency and liquidity contagion will happen concurrently. A failing bank essentially becomes insolvent and thus impacts all its creditor banks. At the same time it starts to liquidate its assets to meet as much of its obligations as possible. This process of liquidation generates a liquidity contagion as the trigger bank starts to call back its loans. The lender/creditor banks which are well capitalised will survive the shock and will generate no further contagion. On the other hand, those lender banks whose capital falls below the threshold core capital ratio of 6 per cent will trigger a fresh contagion. Similarly, the borrowers whose liquidity buffers (for the analysis, excess CRR, excess SLR, available MSF and available export credit refinance are considered as liquidity buffers) are sufficient will be able to tide over the stress without causing further contagion. But some banks may have to call back certain assets (for the analysis, only short term money market asset have been assumed to be callable) after exhausting its liquidity buffers to address the liquidity stress. This process of calling in short term assets will again propagate a contagion. The contagion from both the solvency and liquidity side will stop/ stabilise when the loss/shocks are fully absorbed by the system with no further banks coming under duress.

depicting the stylised process of solvency and liquidity contagion is presented in Chart 2.7.

2.19 Considering the same trigger banks as earlier, the failure of any of the two banks with the largest net borrower positions can potentially result in enormous loss in banking sector capital due to the joint liquidity and solvency contagion (about three fourths of Tier 1 capital of the banking sector). However, the losses are significantly lower (though not insignificant) if it is assumed that PSBs will not be allowed to fail (Table 2.3).

Chart 2.7: Flowchart depicting a joint liquidity solvency contagion



Scheduled Commercial Banks[9]

Trends in Credit and Deposit

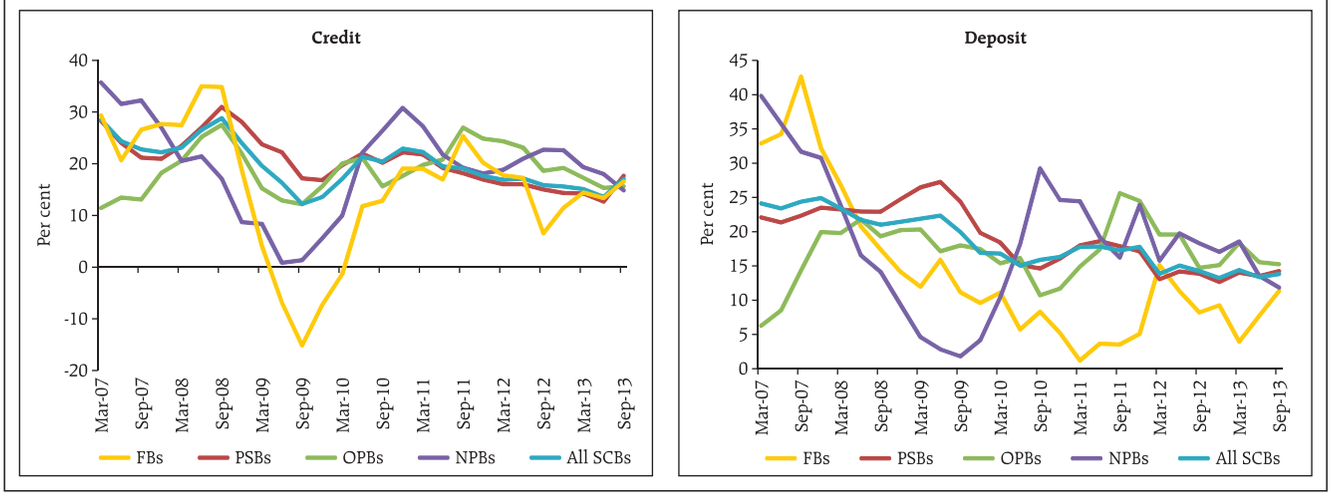
2.20 Credit growth on y-o-y basis during the period ended September 2013 at 17.1 per cent exceeded the growth in deposits at 13.8 per cent. As a result there has been a significant rise in the incremental C-D ratio on y-o-y basis to 91.9 per cent as at end September 2013 from 79.6 per cent as at end March 2013. Viewed in the context of falling household financial savings as per cent of GDP, and the reliance on deposits by banks as the dominant source of funding, this trend is a cause for concern. Bank group wise data on credit and deposit trends are given in Chart 2.8.

Table 2.3: Joint Solvency-Liquidity Contagion Triggered by Top 5 Net Borrowers

Trigger Bank	Percentage loss of Tier I capital of the banking system assuming all banks have the same probability of failure	Percentage loss of Tier I capital of the banking system assuming that PSBs will not fail
A	76.5	22.2
B	74.5	23.4
C	24.4	19.1
D	17.2	16.1
E	22.6	17.2

Source: RBI Staff Calculations

Chart 2.8: Credit and Deposit: Y-o-Y Growth



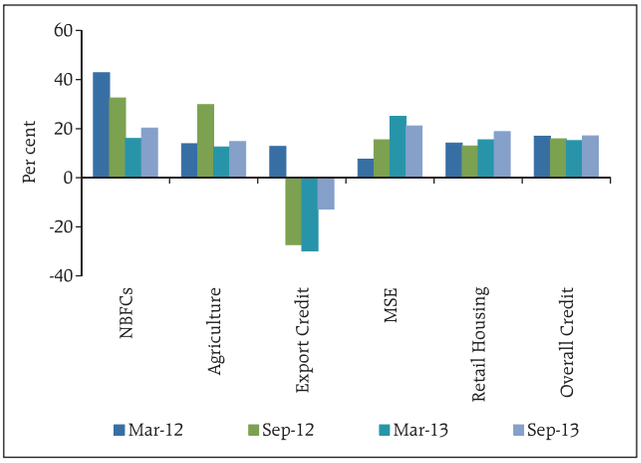
Note: PSBs=Public Sector Banks, NPBs=New Private Banks, OPBs=Old Private Banks and FBs=Foreign Banks
Source: RBI Supervisory Returns

[9] Analyses of SCBs are based on their domestic operations.

Sector-wise Deployment of Credit

2.21 Year-on-year credit growth to medium and small enterprises declined from 25.0 per cent as at end March 2013 to 21.1 per cent as at end September 2013. Export credit continued to contract while credit growth to retail housing increased to 18.7 per cent as at end September 2013 from 15.5 per cent as at March 2013 (Chart 2.9).

Chart 2.9: Credit Growth-Select Sectors



Source: RBI Supervisory Returns

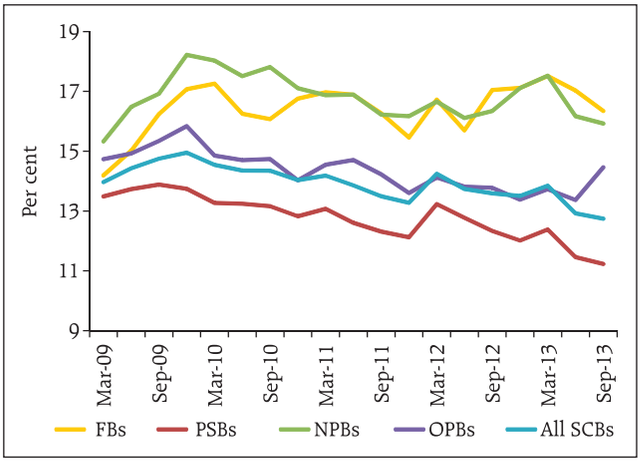
Soundness

Capital Adequacy

2.22 The Capital to Risk Weighted Assets Ratio (CRAR)[10] at system level declined to 12.7 per cent as at end September 2013 from 13.8 per cent in as at end March 2013 (Chart 2.10).

2.23 At bank-group level, PSBs recorded the lowest CRAR at 11.2 per cent as at end September 2013 followed by OPBs at 14.5 per cent. The CRAR of FBs and NPBs were 16.3 per cent and 15.9 per cent, respectively (Chart 2.10).

Chart 2.10: Capital to Risk Weighted Assets Ratio



Source: RBI Supervisory Returns

2.24 The changing pattern of Risk Weighted Assets (RWA) was studied based on the trend in the RWA to total assets[11] ratio and Coefficient of Variation (CV)[12] of the ratio among the banks[13]. The RWA to total assets ratio measures riskiness of assets of SCBs, whereas, CV measures the normalised dispersion among the bank-wise RWA to total assets ratio. A rising trend in RWA to total assets along with declining trend in CV indicates that the rise in proportion of risky assets in the total assets of SCBs is becoming more broad-based involving more banks (Chart 2.11).

2.25 Some possible reasons for the rise in the RWA to total assets could be the downgrading of some borrowers and rising NPAs. It was observed that the share of 'A and above' rated corporate exposures of SCBs, attracting less than 100 per cent risk weights,

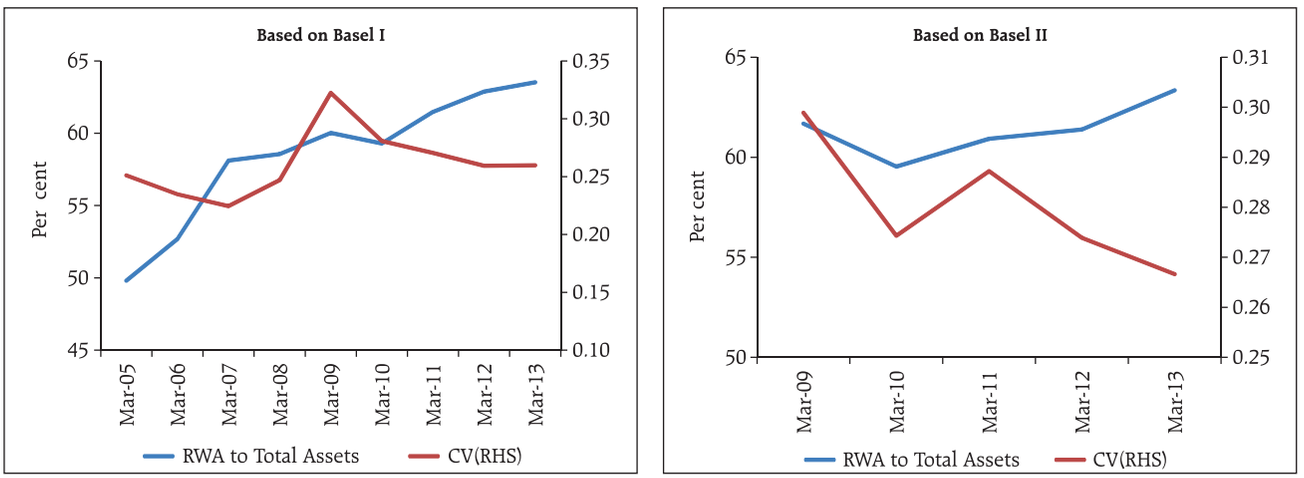
[10] Since June 2013, SCBs started reporting CRAR as per Basel III guidelines.

[11] Total assets comprise on-balance sheet as well as off-balance sheet items.

[12] Coefficient of Variation of a variable $X = \frac{\text{Standard Deviation of X}}{\text{Mean of X}}$

[13] This analysis is based on 63 SCBs and comprises 95 per cent assets of all SCBs.

Chart 2.11: Trend in RWA to Total Assets and CV of SCBs



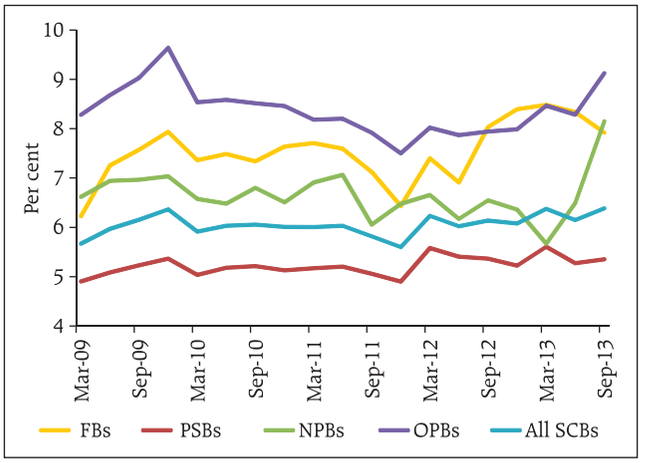
Source: RBI Supervisory Returns

declined from around 45 per cent of the total long term rated advances as at March 2009 to around 22 per cent as at March 2013. Whereas, 'BBB and below' rated corporate exposures of SCBs, attracting risk weights in the range of 100 to 150 per cent, increased from around 55 per cent to around 78 per cent during same period.

Leverage

2.26 The Tier I leverage Ratio[14] of SCBs was 6.4 per cent as at end September 2013 against 6.4 per cent and 6.1 per cent of March 2013 and September 2012, respectively. Among the bank-group level, NPBs recorded the highest Tier I leverage ratio at 9.1 per cent as at end September 2013, whereas, in the case of the PSBs, it was the lowest at 5.4 per cent (Chart 2.12).

Chart 2.12: Leverage Ratio of SCBs



Source: RBI Supervisory Returns

Estimation of Losses[15], Provisioning and Capital Adequacy

2.27 The estimated expected loss (EL) of SCBs at system level increased to 2.5 per cent of total advances as at end September 2013 from 2.1 per cent as at end

[14] Tier I Leverage Ratio is here defined as the ratio of Tier I capital to Total Assets. Total Assets includes off-balance sheet items also.

[15] Procedure of Estimation of Losses is given in the Annex-2. Internationally, it is recommended to use estimated losses (EL & UL) approach for the purpose of making provisions and capital, for the next one year. For this purpose, PD is derived based on annual slippage. As the purpose of this study is to judge the adequacy of provisioning and capital levels being maintained by SCBs and not to estimate the required level of provisions and capital to be maintained for next one year, the PDs being used here is based on GNPA.

Table 2.4 Estimated Losses of SCBs

(Per cent to Total Advances)

End-Quarter	Expected Loss			Unexpected Loss			Expected Shortfall		
	Baseline	Medium Stress	Severe Stress	Baseline	Medium Stress	Severe Stress	Baseline	Medium Stress	Severe Stress
Sep-13*	2.5			7.4			7.5		
Mar-14	2.5	2.8	3.2	7.4	8.1	8.9	7.5	8.2	9.0
Sep-14	2.8	3.5	4.3	7.6	8.8	10.0	7.8	8.9	10.2
Mar-15	2.6	3.7	4.9	7.5	9.0	10.6	7.6	9.1	10.8

* Estimation of losses for the quarter ended September 2013 is based on the observed numbers.
Source: RBI Supervisory Returns and Staff Calculations

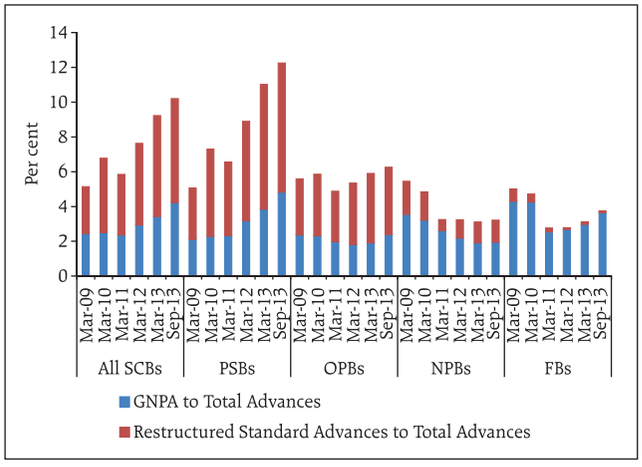
March 2013 and is expected to rise further to 2.8 per cent by September 2014 under baseline scenario (Table 2.4). Under severe stress conditions the EL could increase to 4.9 per cent by March 2015. The present level of total provisions[16] being maintained by the SCBs at 2.8 per cent of total advances, may be just adequate under the baseline scenario, leaving a gap between the present provisioning level and EL under adverse macroeconomic conditions[17]. The unexpected loss (UL) and expected shortfall (ES) of SCBs are estimated to be around 7.4 per cent and 7.5 per cent of total advances for the quarter ended September 2013. The corresponding losses may further rise to 10.6 per cent and 10.8 per cent as at end March 2015 under severe stress scenario. However, the Tier I capital to total advances ratio[18] of 12.5 per cent maintained by SCBs as at the end of September 2013 is sufficient to cover the UL as well as the ES even under severe stress, though the adequacy of Tier I capital varies across banks.

Deteriorating Asset Quality

2.28 Asset quality continues to be a major concern for SCBs. The GNPA ratio of SCBs increased to 4.2 per cent as at end September 2013 from 3.4 per cent of March 2013. The restructured standard advances also increased to 6.0 per cent of total advances as at end September 2013 from 5.8 per cent of March 2013. Overall the stressed advances[19] rose significantly to 10.2 per cent of total advances as at end September 2013 from 9.2 per cent of March 2013 (Chart 2.13).

2.29 Among the bank-groups, the public sector banks continue to have distinctly higher stressed advances at 12.3 per cent of total advances, of which restructured standard advances were around 7.4 per cent (Chart 2.13).

Chart 2.13: Asset Quality of SCBs



Source: RBI Supervisory Returns

[16] Total Provisions include provisions for credit losses, risk provision for standard advances and provisions for restructured standard advances.

[17] The stress scenarios have been defined in table 2.7 under macro-stress tests (Para 2.51).

[18] This Tier I capital to total advances ratio is different from core CRAR and CRAR, which are defined as Tier I capital to RWA and Tier I & II capital to RWA, respectively.

[19] Stressed Advances is defined as GNPA and restructured standard advances.

Concerns on Restructuring

2.30 Concerns have emerged regarding the large and growing quantum of 'forborne' assets and their potential impact on the asset quality of banks. There was a sharp uptick in growth rate of restructured advances in 2008-09, due to relaxation in asset classification for restructured advances granted by the Reserve Bank in the wake of the global financial crisis. Thereafter, the growth rate of restructured advances has remained relatively high with the ratio of restructured advances to standard advances showing a secular increase and remaining above the GNPA ratio. The regulatory concern regarding restructuring arises from the possibility of the relaxations not being used judiciously by banks commensurate with the viability of projects. These relaxations for asset classification/ provisioning will be phased out by April 1, 2015.

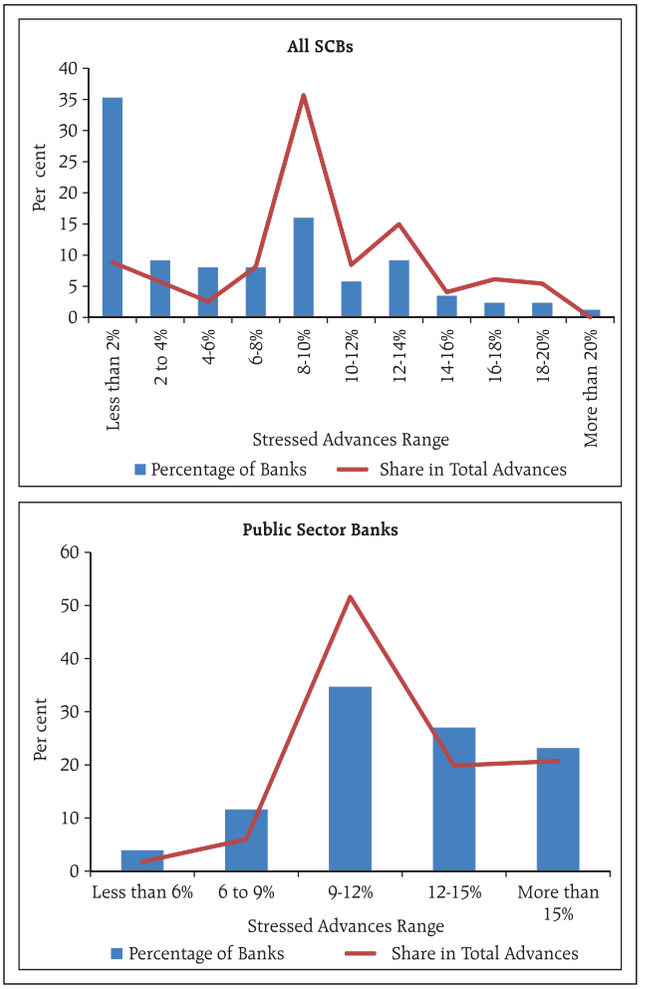
2.31 Bank-wise distribution of stressed advances to total Advances ratio shows that smaller banks have lower stressed advances than the system level average. The largest contribution comes from the PSU banks (Chart 2.14).

Size of Industries

2.32 The stressed advances of medium and large sized industries (including large projects) account for 16.3 and 17.1 per cent of total advances to the respective segments, whereas, in the case of 'micro & small' sized industries stressed advances were around 8.2 per cent of the total advances to the segment. The services sector has also been registering similar trend but their stressed advances ratio is lower than that of industries (Chart 2.15).

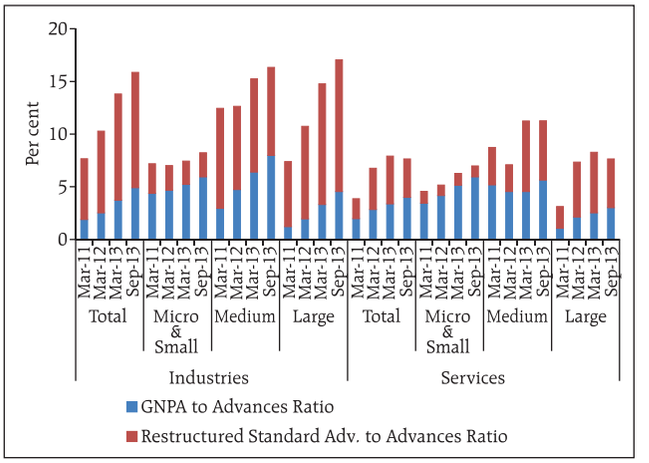
2.33 Medium & large segments of both industries and services taken together have stressed advances ratio around 14.5 per cent of total advances in that segment and in the case of public sector banks they are around 17 per cent followed by old private banks at 13.6 per cent. Though the share of medium & large segments to total loans is the highest for foreign banks around 74 per cent, the level of stressed advances in this bank-

Chart 2.14: Distribution of Stressed Advances: Bank-wise-September 2013



Source: RBI Supervisory Returns

Chart 2.15: Asset Quality at System Level: Industries' Size-wise



Note: GNPA and Restructured Standard Advance to Total Advance in the respective segments.
Source: RBI Supervisory Returns

group is only 4.2 per cent. The share of medium & large segments to total loans is the second largest for the public sector banks and they also have the highest stressed advances in this segment (Chart 2.16). Further, the medium and large segments, having a share of about 54 per cent in total advances, accounted for over 90 per cent of restructured accounts. The share of micro and small segments is marginal.

Sectors' Contribution to GNPAs

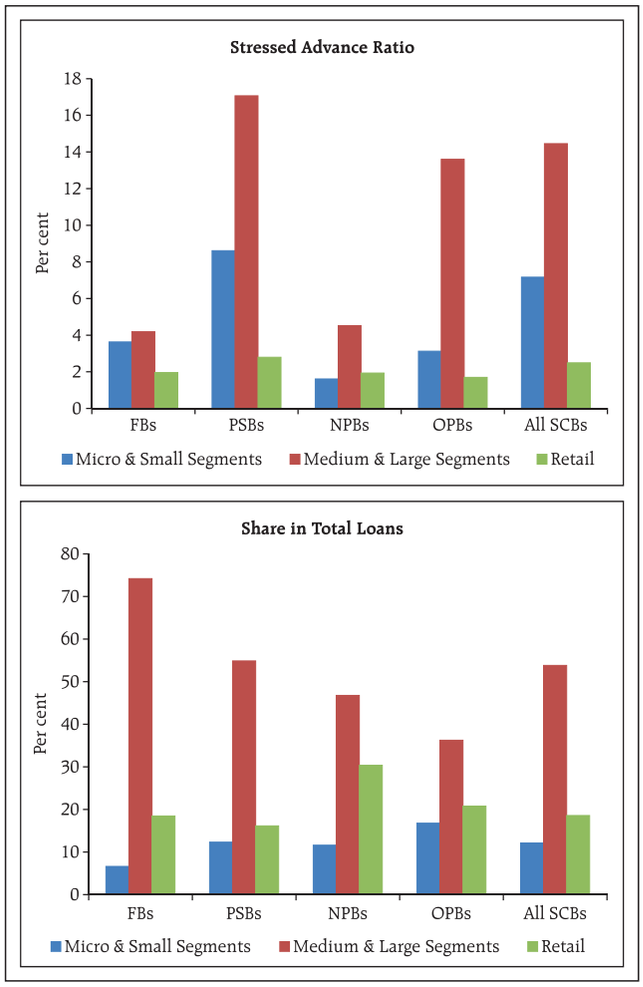
2.34 Though agriculture recorded the highest GNPA ratio at 5.5 per cent as at end September 2013 followed by industries at 4.9 per cent, industries recorded the highest share in restructured standard advances as per cent of total advances at 10.9 per cent as at end September 2013. Industries thus contributed the highest share of stressed advances in their loans portfolio at 15.9 per cent as at end September 2013, followed by services at 7.6 per cent. Loans under the retail segment fared much better with GNPA and restructured standard advances to total advances at 2.2 per cent and 0.3 per cent as at end September 2013, respectively (Chart 2.17). Incidentally, the new private sector banks, having the largest share of retail segment in their loans portfolio around 30 per cent, seemed to have benefited in terms of better asset quality relative to other bank-groups. Public sector banks have the lowest share of retail segment in their loans portfolio - around 16 per cent (Chart 2.16).

2.35 There are five sectors, namely, Infrastructure, Iron & Steel, Textiles, Aviation and Mining which have high level of stressed advances. At system level, these five sectors together contribute around 24 percent of total advances of SCBs, and account for around 51 per cent of their total stressed advances (Table 2.5).

2.36 The share of above mentioned five sectors in the loans portfolio of Public Sector Banks is the highest around 55 per cent followed by Old Private Sector Banks.

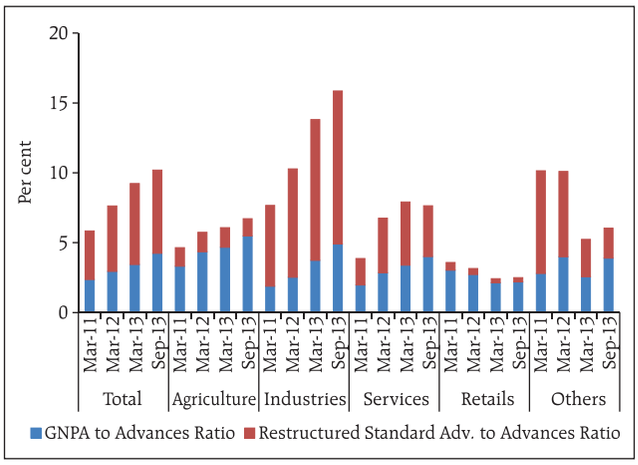
2.37 There are various factors affecting the asset quality of SCBs adversely, such as the current

Chart 2.16: Size-wise Asset Quality and Share: Bank-group wise (Sep-13)



Note: Stressed Advance Ratio is Stressed Advance to Total Advance in the respective segments.
Source: RBI Supervisory Returns

Chart 2.17: Asset Quality at System Level: Major Sectors



Source: RBI Supervisory Returns

Table 2.5: Major Contributor to Stressed Advances of SCBs

(Per cent)

Sector		Mar-09	Mar-10	Mar-11	Mar-12	Mar-13	Sep-13
Infrastructure	Share in Total Advances	9.5	11.8	13.5	13.2	14.5	14.7
	Share in Total Stressed Advances	8.3	8.8	8.4	21.2	27.6	30.3
Iron & Steel	Share in Total Advances	3.9	4.1	4.4	4.6	4.9	4.7
	Share in Total Stressed Advances	5.1	7.8	7.7	6.7	8.1	9.2
Textiles	Share in Total Advances	3.8	3.8	3.8	3.4	3.7	3.4
	Share in Total Stressed Advances	9.0	11.6	12.2	8.9	7.4	7.4
Aviation	Share in Total Advances	0.9	1.0	0.9	0.7	0.5	0.5
	Share in Total Stressed Advances	0.1	1.1	1.8	6.3	3.5	3.5
Mining	Share in Total Advances	0.5	0.6	0.7	0.7	0.7	0.6
	Share in Total Stressed Advances	0.3	0.2	0.4	0.4	0.5	0.8
Total of these Sectors	Share in Total Advances	18.6	21.3	23.3	22.6	24.2	23.9
	Share in Total Stressed Advances	22.8	29.5	30.5	43.3	47.2	51.1

Source: RBI Supervisory Returns

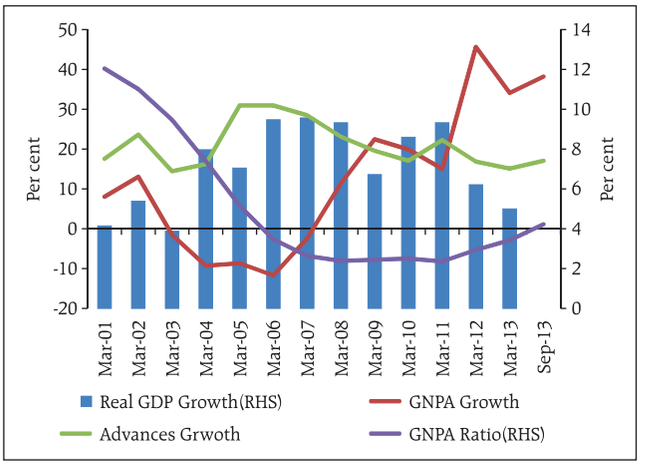
slowdown- global and domestic, persistent policy logjams, delayed clearances of various projects, aggressive expansion by corporate during the high growth phase, inadequate credit appraisal, *etc.*

Credit Appraisal

2.38 Before 2008, asset quality of SCBs was improving on a secular basis, following implementation of Prudential Guidelines. The GNPA ratio had declined sharply from 12.0 per cent as at end March 2001 to 3.5 per cent as at end March 2006 and thereafter this ratio was flat till March 2011. The GNPA ratio has been persistently rising since then. The trend is not uniform across bank – groups. It is possible that boom period credit disbursal was associated with less stringent credit appraisal, amongst various other factors that affected credit quality. During 2005-08, the Indian economy was growing at around 9 per cent, the y-o-y growth in loans moved up from 16 per cent in 2004 to a peak of 31 per cent in 2005-06. One of the major reasons behind this accelerated credit growth could be the competitive credit disbursal under the erstwhile PLR regime and surplus available with banks for credit due to sharp decline in the statutory liquidity ratio (SLR) from 30.5 per cent of total assets as at end March 2005 to 22.6 per cent as at end March 2008. In addition, the push for infrastructure projects, many of which later got into a logjam, also resulted in accelerated growth in GNPAs since 2006 (Chart 2.18).

2.39 Early detection and prompt corrective action in problem accounts, concerted efforts at recovery, improvements in corporate governance, accountability at all levels, a more supportive legal infrastructure, *etc.* could go a long way in addressing issues related to asset quality. These issues are being addressed

Chart 2.18: Performance of the Economy and NPAs



Source: RBI Supervisory Returns and CSO Data

through policy guidelines being framed by the Reserve Bank. In this context, Reserve Bank has brought out a discussion paper on "Early Recognition of Financial Distress, Prompt Steps for Resolution and Fair Recovery for Lenders: Framework for Revitalising Distressed Assets in the Economy" (Box 2.1).

Components of NPA: Recovery Management

2.40 Over time, share of upgradation in the reduction of NPAs has increased significantly, while write-offs continued to be the highest contributor. Though reduction in NPAs due to write-offs can help banks manage their tax liabilities on impaired loans,

Box 2.1: Discussion Paper on 'Early Recognition of Financial Distress, Prompt Steps for Resolution and Fair Recovery for Lenders: Framework for Revitalising Distressed Assets in the Economy'

In order to ensure that the banking system recognises financial distress early, takes prompt steps to resolve it, and ensures fair recovery for lenders and investors, the Reserve Bank has come up with a discussion paper which outlines a corrective action plan that will incentivize early identification of problem cases, timely restructuring of accounts which are considered to be viable, and prompt steps by banks for recovery or sale of unviable accounts. The major proposal in the discussion papers are as follows:

- Early formation of a lenders' committee with timelines to agree to a plan for resolution: When principal or interest payment overdue between 61-91 days, all lenders, including NBFC-SIs, should form a lenders' committee to be called Joint Lenders' Forum (JLF) under a convener and formulate a joint corrective action plan (CAP) for early resolution of the stress in the account. JLF formation and subsequent corrective actions will be mandatory in accounts having aggregate fund-based and non-fund based exposures of ₹1000 million and above. Even in other cases lenders have to monitor the asset quality and take corrective actions for effective resolution as deemed appropriate, under our extant guidelines. The option under CAP by the JLF would generally include; rectification, restructuring and recovery.
- Incentives for lenders to agree collectively and quickly to a plan – better regulatory treatment of stressed assets if a resolution plan is underway, accelerated provisioning if no agreement can be reached.
- Improvement in current restructuring process: Independent evaluation of large value restructurings mandated, with a focus on viable plans and a fair sharing of losses (and future possible upside) between promoters and creditors.
- More expensive future borrowing for borrowers who do not co-operate with lenders in resolution.
- Lenders should carry out their independent and objective credit appraisal in all cases and must not depend on credit appraisal reports prepared by outside consultants, especially the in-house consultants of the borrower company. Lenders should ascertain the source and quality of equity capital brought in by the promoters /shareholders. While carrying out the credit appraisal, banks should verify as to whether the names of any of the directors of the companies appear in the list of defaulters/ willful defaulters. Further, with a view to ensuring proper end-use of funds and preventing diversion/ siphoning of funds by the borrowers, lenders could consider engaging auditors for specific certification purpose without relying on certification given by borrower's auditors.
- More liberal regulatory treatment of asset sales;
  - Lenders can spread loss on sale over two years provided loss is fully disclosed.
  - Takeout financing/refinancing possible over a longer period and will not be construed as restructuring.
  - Leveraged buyouts will be allowed for specialised entities for acquisition of 'stressed companies'.
  - Steps to enable better functioning of Asset Reconstruction Companies mooted.
  - Sector-specific companies/private equity firms encouraged to play active role in stressed assets market.

it impacts their profitability and ability to raise resources (Chart 2.19). While recurring and systemic write-offs are a concern for the regulator, the banks' boards are expected to be judicious in permitting write offs.

2.41 The y-o-y growth in slippages has increased after the recent financial crisis. However, simultaneously, y-o-y growth in upgradation of NPAs has also increased though the trends have been diverse across bank groups. (Chart 2.19).

2.42 The ratio of slippages to recovery and upgradation for the banking sector as a whole deteriorated from a low of 125.4 per cent in 2005-06 to 264.1 per cent during 2009-10 and remained elevated at 257.0 per cent in 2012-13. Recovery performance also varied widely across banks.

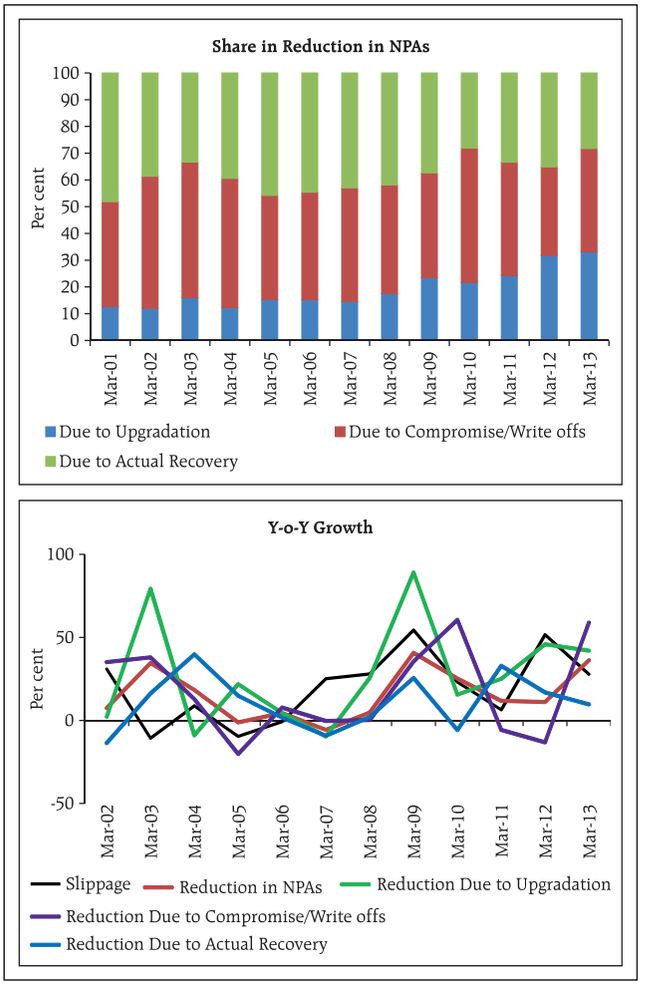
Other Issues

2.43 Excessive volatlity in INR could affect corporates with unhedged exposures, eventually leading to adverse impact on asset quality of banks. An assessment of the exact quantum of unhedged exposures of corporates is difficult with the current level of information available. To minimize the risk, banks have been advised to price the risk of unhedged exposures into their credit risk premia, during their credit appraisal. Reserve Bank has also issued draft guidelines requiring banks to make incremental provisions and capital based on the estimated likely losses for corporates from such unhedged forex exposures.

Profitability

2.44 The profitability of all SCBs, measured by return on assets (RoA) and return on equity (RoE) declined to 0.8 per cent and 10.2 per cent in September 2013, respectively, from 1.0 per cent and 12.9 per cent in March 2013. The growth in profit after tax (PAT) decelerated to -9.7 per cent during September 2013 from 12.9 per cent of March 2013, mainly due to the lower growth in net interest income, higher risk provisions and write-offs. Y-o-Y growth in other operating income increased to 30.5 per cent during

Chart 2.19: Movement in Various Components of NPAs



Source: RBI Supervisory Returns

September 2013 from 14.4 per cent of March 2013 due to the higher income from fee based services and forex operations (Table 2.6).

2.45 Withdrawal of the special concessions in terms of asset classification/provisioning provided on restructuring, would lead to increase in provisioning requirements of the banking sector especially for PSBs. Further, banks are required to estimate and make provisions for employee benefits including pension and other superannuation benefits based on actuarial valuations as per AS-15. The IBA guidance note dated February 26, 2013 on funding superannuation benefits to be followed uniformly by all banks, could also translate into additional provisioning requirements.

Table 2.6: Profitability of SCBs

(Per cent)

	Y-o-Y Growth						Return on Assets	Return on Equity
	Net Interest Income Growth	Other Operating Income Growth	Earning Before Provisions & Taxes Growth	Risk Provisions Growth	Profit Before Tax Growth	Profit After Tax Growth		
Mar-09	24.4	24.0	33.1	35.5	27.2	23.3	1.1	14.5
Mar-10	14.8	3.1	9.2	13.2	1.7	4.3	1.0	12.9
Mar-11	34.6	0.5	21.7	38.6	26.2	23.6	1.1	13.6
Mar-12	15.8	7.4	15.3	35.6	10.2	14.6	1.1	13.4
Mar-13	10.8	14.4	9.9	10.2	10.3	12.9	1.0	12.9
Sep-13	11.6	30.5	12.8	63.2	-7.6	-9.7	0.8	10.2

Source: RBI Supervisory Returns.

Performance of Overseas Branches of Indian Banks

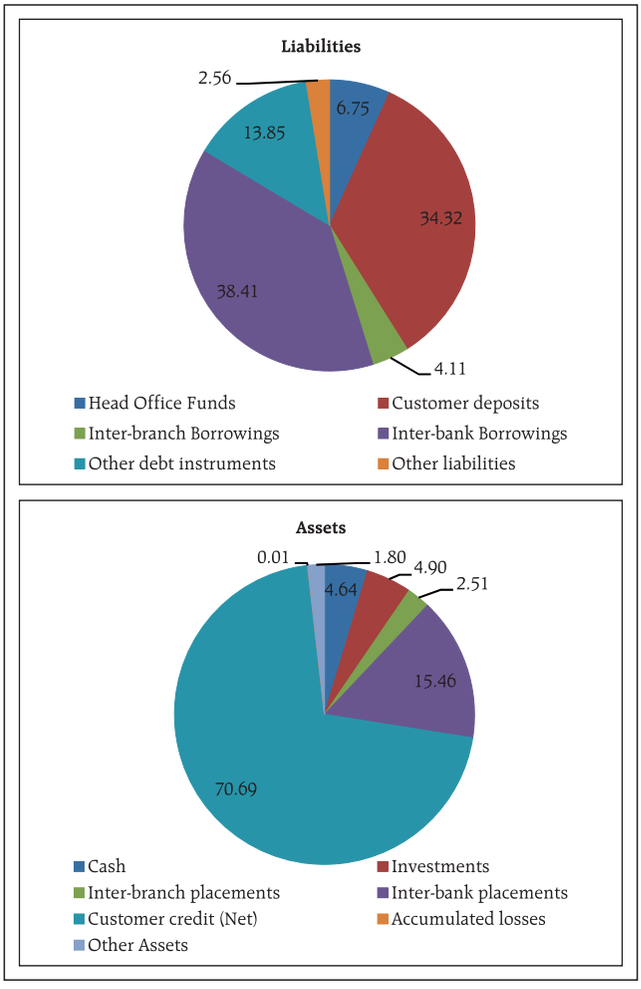
2.46 Indian banks are operating at important financial centres spread over 55 countries through branches, subsidiaries, joint ventures and representative offices (ROs). They had a network of 178 branches (including Overseas Banking Units (OBUs)), 24 subsidiaries, 7 joint ventures and 54 ROs as at end March 2013 as against 165 branches (including OBUs), 24 subsidiaries, 6 joint ventures and 55 ROs as at end March 2012.

2.47 Inter-bank borrowings and customer deposits are the major components of the liabilities of overseas branches of Indian banks, which together contribute around 73 per cent of total liabilities. Customer credit and interbank placement are the major components of the total assets of overseas branches, which together contributes around 86 per cent of total assets (Chart 2.20)

2.48 The total assets of overseas branches of Indian banks increased by USD 25.6 billion to USD 154.9 billion as at March 31, 2013 mainly due to the increase in customer credit (gross) by USD 15.3 billion and inter-bank placement by USD 7.6 billion over the previous year. This asset growth was funded mainly by inter-bank borrowings (USD 9.3 billion), customer deposits (USD 8.8 billion and other debt instruments (USD 4.9 billion).

Chart 2.20: Liabilities and Assets Composition of Overseas Branches of Indian Banks- March 2013

(Per cent)



Source: RBI Supervisory Returns

2.49 Gross problem assets (credit plus investments) of the overseas branches had risen sharply by 78 per cent to USD 1.8 billion as at end March 2013 from USD 1.0 billion of March 2012. Consequently, the ratio of problem assets to total assets has gone up to 1.2 per cent in March 2013 from 0.8 per cent in March 2012.

2.50 The aggregate net profit of the overseas branches of Indian banks during FY: 2012-13 declined by 7.3 per cent to USD 1.4 billion against increase of net profit by 24.6 per cent during the last financial year. This decline in net profit growth resulted in fall of RoA of overseas branches of Indian banks to 0.9 per cent as at end March 2013 from 1.3 per cent of March 2012.

Resilience - Stress Tests

Macro Stress Test - Credit Risk

2.51 The resilience of the Indian banking system to macroeconomic shocks is tested through a series of macro stress tests for credit risk at the *system*, *bank-group* and *sector* level. These tests encompass assumed risk scenarios incorporating a baseline and two adverse macroeconomic scenarios representing medium and severe risk (Table 2.7). The adverse scenarios were derived broadly based on 0.5 to 1.0 standard deviation for medium risk and 1.25 to 2.0 standard deviation for severe risk (10 years historical data).

System Level Credit Risk

2.52 The macro stress tests on credit risk suggest that under baseline scenario, GNPA ratio of all SCBs is expected to rise to around 4.6 per cent by September 2014 from 4.2 per cent as at end September 2013, which may subsequently improve to 4.4 per cent by March 2015 if the macroeconomic conditions improve. Whereas, if the macroeconomic conditions deteriorate further, the GNPA may rise further and under severe stress conditions, it could move upto 7.0 per cent by March 2015. Under such severe risk scenario, the system level CRAR of SCBs could decline to 11.1 per cent by March 2015, but still remain above the regulatory requirement of 9 per cent (Chart 2.21).

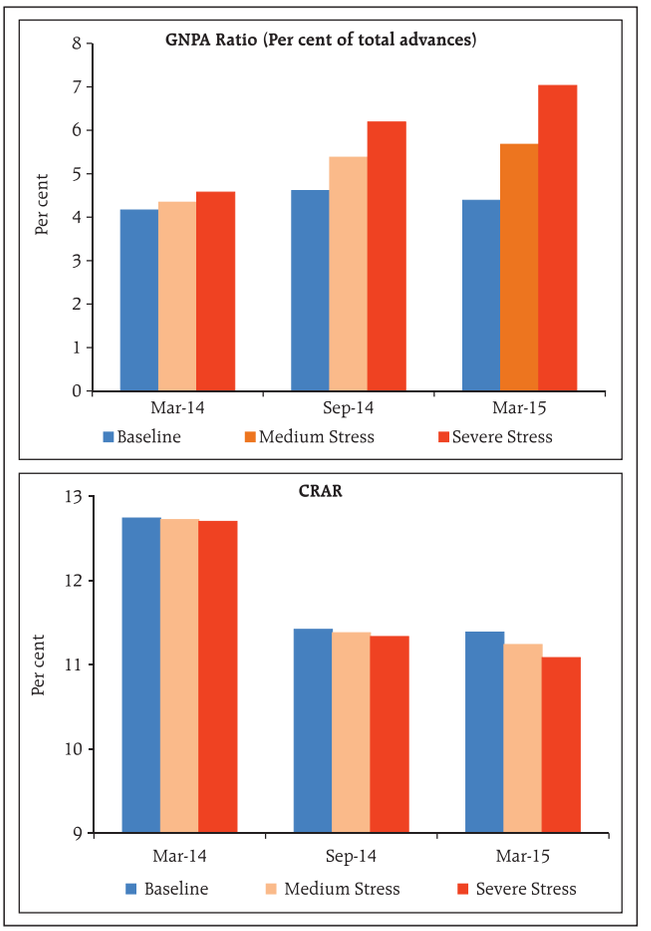
Table 2.7: Macroeconomic Scenario Assumptions[20]

(Per cent)

FY	Macro-variable	Baseline	Medium Stress	Severe Stress
2013-14*	GDP Growth	5.0	3.6	2.0
	WPI Inflation	6.5	8.2	10.2
	Short-term Interest Rate	8.4	9.6	11.1
	Exports to GDP Ratio	15.2	13.9	12.4
	Gross Fiscal Deficit	4.8	5.6	6.6
2014-15	GDP Growth	5.8	3.6	1.5
	WPI Inflation	6.0	8.6	12.5
	Short-term Interest Rate	8.3	10.3	12.2
	Exports to GDP Ratio	15.4	13.4	11.4
	Gross Fiscal Deficit	4.7	6.0	7.4

* Average for the last two quarters (December & March) of 2013-14.

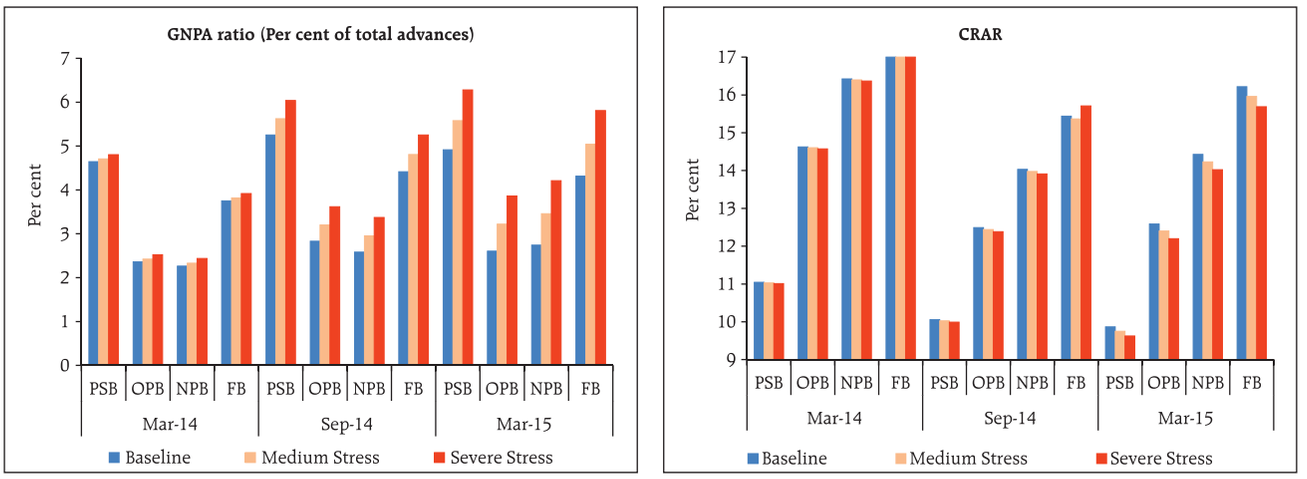
Chart 2.21: Projection of System Level GNPAs & CRAR of SCBs



Note: The projection of system level GNPA has been done using three different but complementary econometric models, *viz.*, Multivariate regression, Vector Autoregression (which takes into accounts feedback impact of credit quality to macro variables and interaction effects) and Quantile regression (which can deals tail risk and takes into account non-linear impact of macroeconomic shocks).
Source: RBI Supervisory Returns and Staff Calculations

[20] These stress scenarios are stringent and conservative assessments under hypothetical-severely adverse economic conditions and should not be interpreted as forecasts or expected outcomes.

Chart 2.22: Projection of Bank-group wise GNPAs and CRAR



Note: Projection of GNPA at bank-group level was done using multivariate regression model, which does not take into account feedback and non-linear impact impacts.
Source: RBI Supervisory Returns and Staff Calculations

Bank Group Level Credit Risk

2.53 Among the bank-groups, public sector banks are expected to register the highest GNPA ratio. Under baseline scenario, the GNPA of PSBs and foreign banks may be around 4.9 per cent and 4.3 per cent by March 2015, respectively. Whereas, GNPA ratio of old private banks and new private banks are expected to rise to 2.6 per cent and 2.7 per cent by March 2015, respectively, from 2.4 per cent and 1.9 per cent of September 2014 (Chart 2.22).

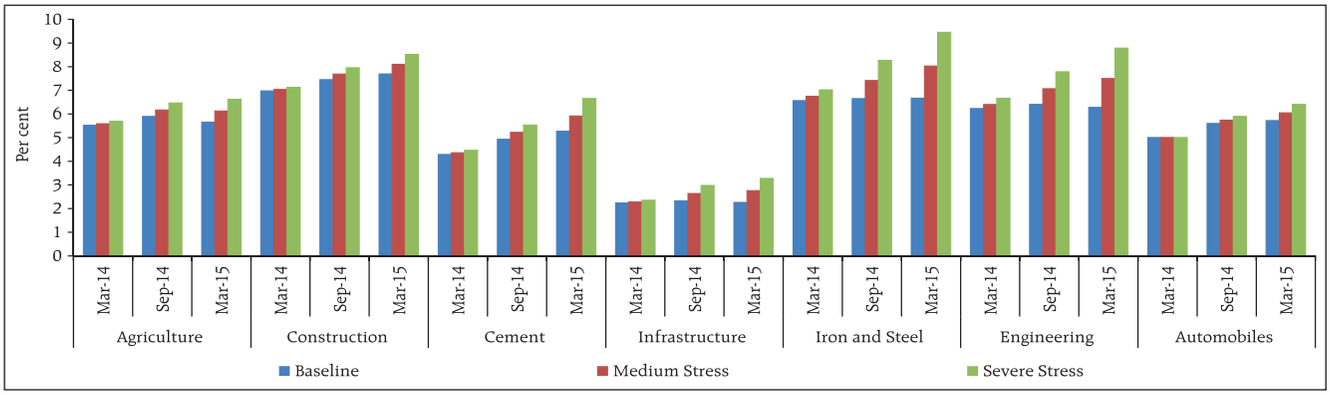
2.54 CRAR of PSBs, which is the lowest at 11.2 per cent, may decline further to 9.6 per cent by March 2015 under severe stress scenario, thus moving much closer to the minimum capital requirement. Under such severe risk scenario, the CRAR of new private sector banks, old private banks and foreign banks may decline to 14.0 per cent, 12.2 per cent and 15.7 per cent by March 2015 from 15.9 per cent, 14.5 per cent and 16.3 per cent recorded as at end September 2013, respectively (Chart 2.22).

Sector Level Credit Risk

2.55 Macro stress test of sector level credit risk revealed that among the selected seven sectors, Construction sector is expected to have highest NPA ratio around 7.7 per cent (under baseline) by March 2015 followed by Iron & Steel. However, the adverse macroeconomic shocks seem to have maximum impact on Iron & Steel and Engineering (Chart 2.23).

Chart 2.23: Projected Sector-wise NPA

(Per cent of gross advances)



Source: RBI Supervisory Returns and Staff Calculations

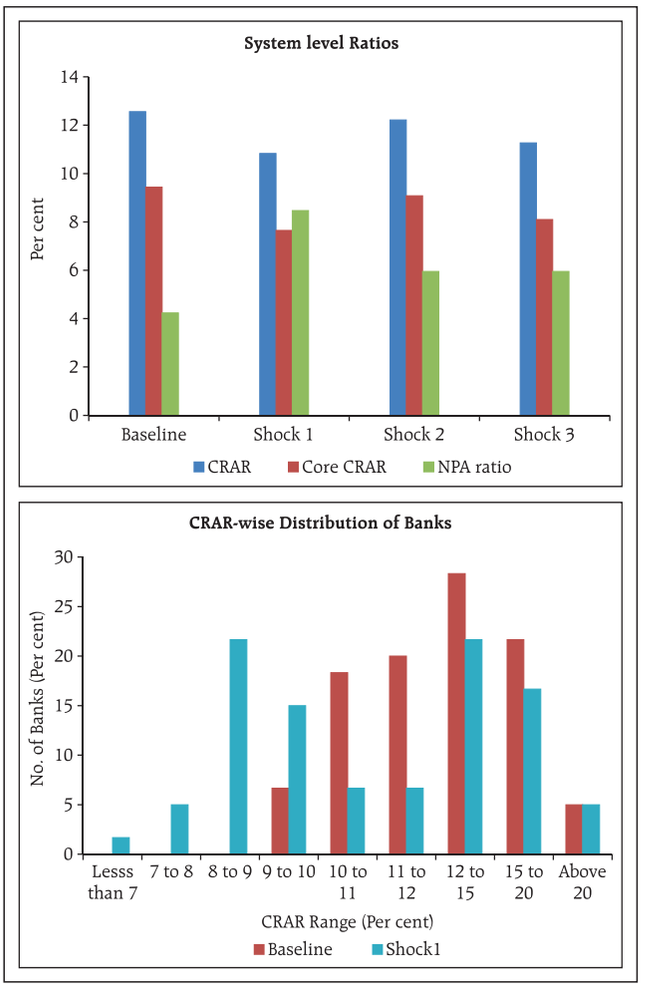
Sensitivity Analysis[21] - Top-Down Stress Tests - Bank Level

2.56 A number of single factor sensitivity stress tests (*top-down*)[22] were carried out on SCBs (60 banks comprising 99 per cent of total banking sector assets) to assess their vulnerabilities and resilience under various shocks and scenarios. The resilience of the commercial banks in respect of credit, interest rate and liquidity risks were studied through top down sensitivity analysis by imparting extreme but plausible shocks. The results are based on September 2013 data.

Credit Risk

2.57 Under different static credit shocks as on September 2013, the system level CRAR of SCBs still remained above the required minimum of 9 per cent (Chart 2.24). The capital losses at the system level could be about 15 per cent in the case of severe stress condition (shock 1). Further, under this scenario, the impact on profitability of banks would be quite significant as their entire profit (before tax) would be lost and the system level (tier I) leverage ratio[23] would come down from 6.6 per cent to 5.3 per cent. The stress test results further showed that 28 percent banks, sharing about 43 percent of SCBs' total assets, would fail to maintain required CRAR with 100 per cent assumed rise in NPAs (shock 1). Also leverage ratio of 15 percent banks, sharing about 11 percent of SCBs' total assets, would fall below 3 percent under this scenario.

Chart 2.24: Credit Risk



Shock 1: NPAs increases by 100 per cent
Shock 2: 30 percent of restructured advances turn into NPAs (Sub-Standard category)
Shock 3: 30 percent of restructured advances are written-off (Loss category)
Source: RBI Supervisory Returns and Staff Calculations

[21] The sensitivity analysis is done in addition to macro stress tests; while in the former shocks are given directly to asset quality (NPAs), in the latter, shocks are in terms of adverse macroeconomic conditions, Also, macro stress tests are done at system, bank-group and sectoral levels, whereas, sensitivity analysis was done at system, bank-group and bank levels.

[22] For details on stress tests, please refer to the Annex-2. The provisioning norms used for these stress tests are based on existing average prescribed provisioning for different asset categories, instead of enhanced provisioning requirements considered in earlier FSRs. The provisioning requirements have been taken as 25, 75 and 100 per cent for sub-standard, doubtful and loss advances, respectively. Further, the norms have been applied only on the additional NPAs, calculated under a stress-scenario, instead of on the entire credit portfolio. As a result of assumed increase in NPAs, loss of income on the additional NPAs for one quarter is also included in total losses in addition to additional provisioning requirements. This aims to provide a more realistic loss estimates under the assumed stress scenarios.

[23] Leverage ratio is defined as a percentage of Tier I capital to Total Assets (On-balance-sheet-Assets + Off-Balance-Sheet-Credit-equivalent).

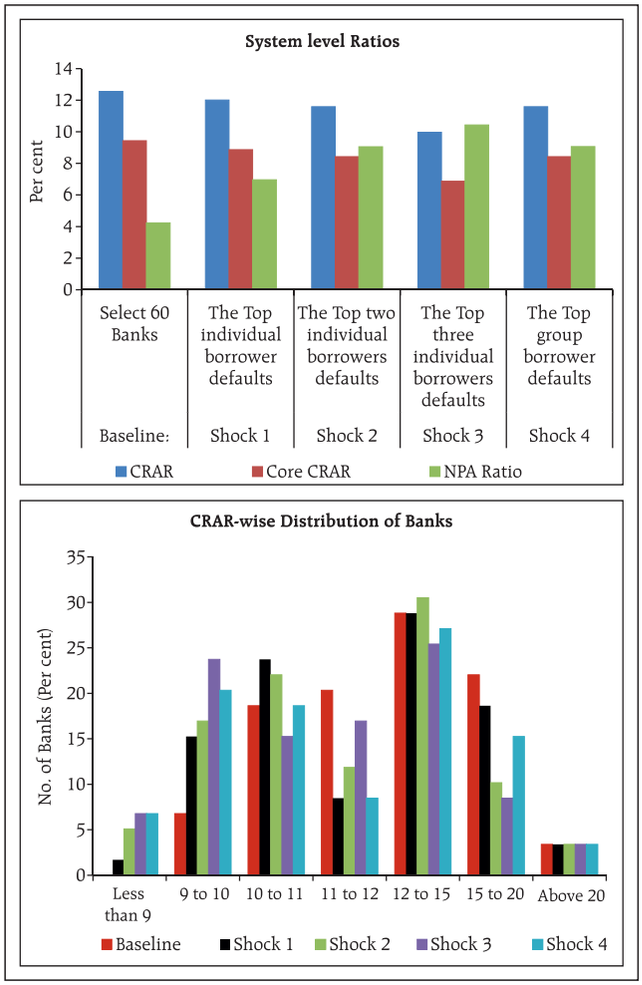
2.58 The impact of credit shocks on Public Sector Banks are more pronounced which would bring down their CRAR from 11.2 per cent to 9.2 per cent under shock1 (100 per cent increase in NPAs). Under the assumed stress scenario (shock1), the leverage ratio of PSBs would also be down by 165 basis points.

2.59 The stress tests on credit concentration risk of banks show that the impact under various stress scenarios is significant for about 7 per cent of banks, comprising 5 percent of assets, failing to maintain 9 percent CRAR. The impact on CRAR, at the system level, under the assumed scenarios of default of top three individual borrowers and default of top group borrower would be 259 and 98 basis points respectively and the system should be able to withstand these shocks (Chart 2.25).

Interest Rate Risk

2.60 The interest rate risk in the trading book (direct impact on AFS and HFT portfolio of banks) under various stress scenarios is manageable with reduction in CRAR by 71 basis points at the system level, with a few small banks getting impacted adversely. The total capital loss at system level would be about 5.6 per cent. This impact is due to upward movement (2.5 percentage points) of yield curve, especially for the low maturity buckets because of their relatively large size. However, the impact in terms of profitability of banks would be significant with about 38 per cent of profit (before tax) of banks being lost under the above shock. The impact of interest rate shock on the trading book has reduced from the estimate of 111 basis points provided in the previous FSR on account of shifting of a few investments from trading book to HTM under the regulatory relaxation provided in August 2013. For an assumed shock of 2.5 percentage points parallel upward shift of the yield curve, the impact on the HTM portfolio of banks, if marked-to-market, could be about 3.1 percentage points on the capital, an increase over the 2.6 percentage points reported in FSR-June 2013.

Chart 2.25: Credit Risk: Concentration



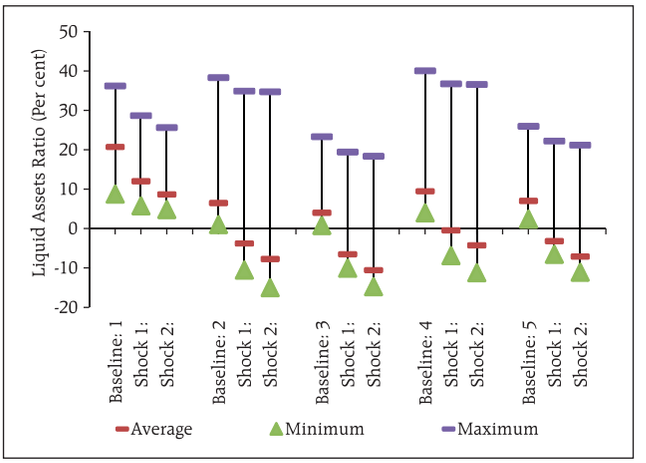
Shock 1: The top individual borrower defaults
Shock 2: The top two individual borrowers defaults
Shock 3: The top three individual borrowers defaults
Shock 4: The top group borrower defaults
Source: RBI Supervisory Returns and Staff Calculations

Liquidity Risk

2.61 To capture the impact on the liquidity risk, analysis has been done with five definitions of liquid assets. As per these definitions, the liquid assets comprise of Cash, CRR, Inter-bank-deposits and Investments. Different liquid asset ratios are arrived at using various definitions under the baseline scenario. The stress scenarios are constructed to test the ability of banks to meet a run on their deposits using only their liquid assets. It is assumed that (1) ten per cent of total deposits would be withdrawn in a short period (say 1 or 2 days) and (2) three per cent of total deposits would be withdrawn in each

day for 5 consecutive days. Under the stress scenarios, there were indications of deterioration in the liquidity position of banks though SLR investments helped the banks to ward off the liquidity pressure; so also CRR deposits to some extent helped to overcome sudden and unexpected withdrawal by depositors (Chart 2.26).

Chart 2.26: Liquidity Risk



Liquid Assets Definitions	
1	Cash + Excess CRR + Inter Bank Deposits + SLR Investments
2	Cash + Excess CRR + Inter Bank Deposits maturing-within-1-month + Investments maturing-within-1-month
3	Cash + Excess CRR + Inter Bank Deposits maturing-within-1-month + Excess SLR Investments
4	Cash + CRR + Inter Bank Deposits maturing-within-1-month + Investments maturing-within-1-month
5	Cash + CRR + Inter Bank Deposits maturing-within-1-month + Excess SLR Investments
A baseline and two shock scenarios have been constructed for each of the above definitions.	
Liquidity Shocks	
Shock1	10 percent deposits withdrawal (cumulative) in a short period (say 1 or 2 days)
Shock2	3 percent deposits withdrawal (each day) within 5 days

Source: RBI Supervisory Returns and Staff Calculations

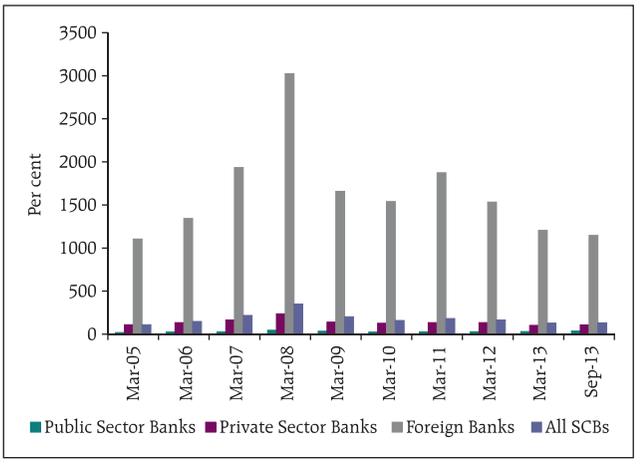
Derivatives Portfolio of Banks

2.62 The derivatives portfolio of banks in India grew sharply in the years leading up to the global financial crisis. Though the portfolio size has shrunk since 2008, it still remains large with the outstanding notional principal constituting over 130 per cent of banks' total assets as on September 30, 2013. The credit equivalent of derivatives portfolio is about 5 per cent of the balance sheet assets. The foreign banks as a group account for about 62 per cent of the outstanding notional principal in the derivatives market, whereas their share in the balance sheet assets of the banking system is only 7.3 per cent. There was a marginal increase in the size of outstanding notional principal and their credit equivalent in September 2013 (Chart 2.27 and 2.28)

2.63 Among the sample banks[24], the majority of outstanding derivative transactions are interbank

Chart 2.27: Trend in Notional Principal of Derivatives

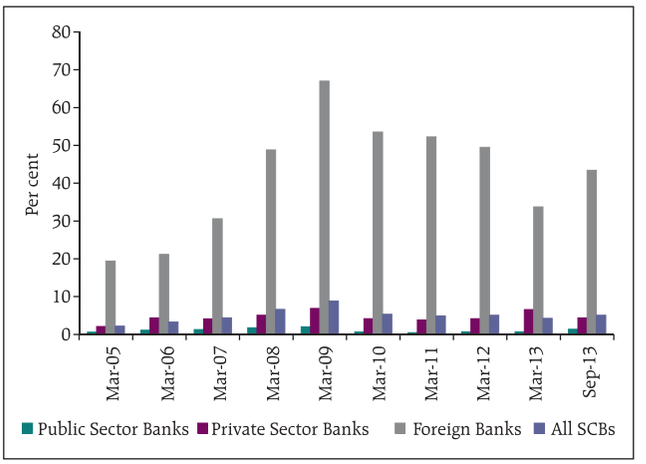
(Per cent to Total Assets)



Source: RBI Supervisory Returns

Chart 2.28: Trend in Credit Equivalent of Derivatives

(Per cent to Total Assets)



Source: RBI Supervisory Returns

[24] Stress tests on derivatives portfolios were conducted for a sample of 24 select banks. Details are in Annex-2.

transactions. The average interbank segment of the derivatives portfolio constituted about 83 per cent of the total outstanding derivatives as at September 2013. The customer segment constituted a small portion of outstanding derivative transactions covering 17 per cent on an average basis. Interestingly the coverage of the customer segment of the public and private sector banks within the overall outstanding derivatives transaction exceeded 20 per cent on an average basis (Chart 2.29).

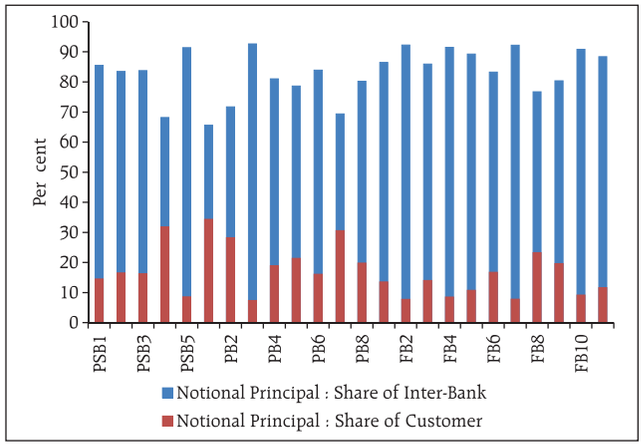
2.64 A series of bottom-up stress tests (sensitivity analysis) on derivative portfolios were conducted for the select sample with the reference date as September 30, 2013. The banks in the sample reported the results of four separate shocks on interest and foreign exchange rates. The shocks on the interest rates ranged from 100 to 250 basis points, while 20 per cent appreciation / depreciation shocks were assumed for foreign exchange rates. The stress tests were carried out for individual shocks, on stand-alone basis. The results showed that the average net impact of interest rate shocks on sample banks was not high. However, the foreign exchange shock scenarios showed relatively large impact in September 2013 position due to the depreciated rupee rate prevailing at that time (Chart 2.30).

Securities Market-Possible Concentration Risks Due to Common Set of Banks in SGF

2.65 The exposures of Settlement Guarantee Funds (SGF) of NSCCL and ICCL to the top 5 banks are 22.9 per cent and 21.8 per cent, respectively, which are well below the exposure limits specified by NSCCL, SGF of 75 per cent to top five banks put together. While the exposure of the SGF of NSCCL and the exposure of the SGF of ICCL are individually less than the upper limit, the fact that three banks are common in the list of top five banks, makes it even more important that the exposures limits are monitored on an ongoing basis (Table 2.8).

Chart 2.29: Share of Inter-bank & Customer Segments in Derivatives Transactions – September 2013

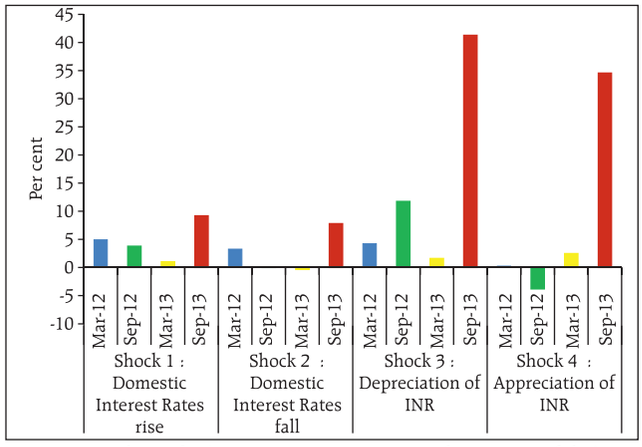
(Per cent to Total Assets)



PSB: Public Sector Bank, PB: Private Sector Bank, FB: Foreign Bank
Source: Sample Banks (Bottom-up stress tests on derivate portfolio)

Chart 2.30: Stress Tests - Impact of shocks on Derivative Portfolio of Select Banks (Change in net MTM on application of a shock)

(Per cent to Capital Funds)



Source: Sample Banks (Bottom-up stress tests on derivate portfolio)

Table 2.8: Exposure of NSCCL and ICCL to Top Five Banks as at end September 2013

NSCCL of NSE			ICCL of BSE		
Sr. No.	**Bank Name**	**Exposure as a % of SGF**	**Sr. No.**	**Bank Name**	**Exposure as a % of SGF**
1.	Bank 1	8.3	1.	Bank 1	7.3
2.	Bank 2	6.2	2.	Bank 2	5.6
3.	Bank 3	4.2	3.	Bank 3	4.6
4.	Bank 4	2.4	4.	Bank 4	2.6
5.	Bank 5	1.9	5.	Bank 5	1.6
Total Exposure to Top 5 Banks		**22.9**	**Total Exposure to Top 5 Banks**		**21.8**

Note: In case of BSE exposure is a % of SGF+Total Liquid Assets
Source: NSE & BSE

Regional Rural Banks (RRBs)

2.66 RRBs account for around 2.6 per cent of the banking assets. Gross loans and deposits of 64 RRBs went up by 20.2 per cent and 13.5 per cent during 2012-13, respectively, thus raising the CD ratio to 66.1 per cent as at end March 2013 from 62.5 per cent of March 2012. The GNPA as per cent of gross loans increased to 5.7 per cent as at March 2013 from 5.0 per cent of March 2012.

Amalgamation of RRBs

2.67 The process of consolidating RRBs was initiated in the year 2005. In the first phase of amalgamation of RRBs which took place between 2005 and 2010, RRBs of the same sponsor banks within a state were amalgamated bringing down their number to 82 from 196. In the current phase of amalgamation, which started from October 1, 2012, the Government of India(GoI) plans to mainly amalgamate geographically contiguous RRBs within a state under different sponsor banks to have just one RRB in medium sized states and 2 or 3 RRBs in large states. GoI has so far issued 18 notifications amalgamating 41 RRBs into 17 new RRBs within 11 states bringing down their effective number to 58. Consequent to the consolidation of RRBs a minimum CRAR of 8 per cent has been prescribed on an ongoing basis with effect from March 31, 2014.

Financial Institutions

2.68 There are four Financial Institutions (FIs) which are under the purview of the Reserve Bank three of these, namely, NABARD, SIDBI and NHB are refinancing institutions(RFIs), whereas, fourth FI, EXIM Bank is a term lending institution (TLI). Total assets of these FIs together is ₹4197.5billion and they are highly capitalized with CRAR of all the four FIs taken together is 18.8 per cent (ranging between 14 to 31 per cent) as at end September 2013 which is well above the minimum regulatory requirement of 9 per cent. Further, these have GNPAs to total gross advances at 0.9 per cent as at end September 2013.

2.69 For long term economic growth, infrastructure development is an important pre requesite. The banking system with its current ALM has borne the burden of financing to a large extent and is showing resultant strains. To ensure availability of substantial and long-term-maturity it may be necessary to revisit the mandate of these institutions and involve them to a greater extent.

Scheduled Urban Co-operative Banks (SUCBs)

2.70 The SUCBs account for 1.5 per cent of the assets of the banking system. At the system level[25], the CRAR of SUCBs declined to 12.5 per cent as at end September 2013 from 12.7 per cent as at end March 2013 but remained above the minimum regulatory requirement of 9 per cent, whereas, at bank level, seven banks failed to maintain the minimum required CRAR. The asset quality of SUCBs, measured in terms of GNPA, deteriorated significantly to 7.5 per cent of gross advances as at end September 2013 from 3.6 per cent as at end March 2013, resulting in significant decline in the provision coverage ratio to 55.3 per cent as at end September 2013 from 77.3 per cent as at end March 2013. The profitability of SUCBs, measured in terms of RoA declined to 0.7 per cent as at end September 2013 form 0.9 per cent as at end March 2013. However, liquidity ratio improved to 34.9 per cent as at end September 2013 from 34.0 per cent as at end March 2013 (Table 2.9).

Table 2.9: Select Financial Soundness Indicators of SUCBs

(Per cent)

	Mar-13	Sep-13
CRAR	12.7	12.5
Gross NPAs to Gross Advances	3.6	7.5
Return on Assets (annualized)	0.9	0.7
Liquidity Ratio	34.0	34.9
Provision Coverage Ratio	77.3	55.3

Note:

1. Data are provisional and based on OSS Returns
2. Liquidity Ratio = 100 * (Cash + due from banks + SLR investment) / Total Assets.
3. PCR = NPA provisions held as per cent of Gross NPAs.

[25] System of 51 SUCBs.

2.71 Stress test for assessment of credit risk was carried out for SUCBs using the data based on Off-Site Surveillance (OSS) returns as on September 30, 2013. The impact of credit risk shocks on the CRAR of the SUCBs was observed under four different scenarios[26]. The results showed that except under the extreme fourth scenario, the system level CRAR of SUCBs remained above the minimum regulatory required level of CRAR, though individually a larger number of banks (more than 50 per cent banks) failed to meet the required level of CRAR.

2.72 Stress test on liquidity risk was carried out under two different scenarios assuming 50 per cent and 100 per cent increase in cash outflows in the 1 to 28 days time bucket. It was further assumed that there was no change in cash inflows under both the scenarios. The stress test results indicate that the SUCBs would be significantly impacted (around 50 per cent banks) even under less severe stress scenario (scenario I).

2.73 The Reserve Bank adopted a multi-layered regulatory and supervisory strategy aimed at the consolidation of UCBs by way of merger/amalgamation of viable UCBs and the exit of unviable banks for the revival of this sector, which led to a gradual reduction in the number of UCBs. The closures of UCBs were due to various reasons such as high non-performing advances, negative net-worth, deterioration in financial health, non-compliance with RBI guidelines, frauds, affairs conducted in a manner detrimental to the interests of depositors, misappropriation of funds, sanctioning of loans in excess of permissible limit, sanctioning of loans to the entity in which directors have interest, *etc.* The total number of UCBs as at end March 2013 stood at 1606 as against 1618 as at end March 2012 (Table 2.10).

Table 2.10: Consolidation in UCB sector

Financial Year (FY)	Number of UCBs				
	Operational as on last day of previous FY	Merged during FY	Cancellation of licenses / rejection of applications for license*	Closed during FY (5)=(3)+(4)	Operational as on last day of current FY
(1)	(2)	(3)	(4)	(5)	(6)
2008-09	1,770	22	27	49	1,721
2009-10	1,721	13	34	47	1,674
2010-11	1,674	13	16	29	1,645
2011-12	1,645	14	13	27	1,618
2012-13	1,618	3	9	12	1,606

*Rejection of application of the existing urban co-operative credit societies for license

Rural Co-operative Banks

Systemic Implications of some Rural Cooperative Banks continuing without licence

2.74 Pursuant to the recommendations of the Committee on Financial Sector Assessment (CFSA), the RBI had revised the licensing norms for rural co-operative banks during October 2009. Accordingly, all 31 State Co-operative Banks and 348 District Central Co-operative Banks (DCCBs) were licensed as on 30 June 2013, whereas, 23 DCCBs in four States had remained unlicensed.

2.75 These 23 DCCBs are not complying with Section 11(1), 22(3)(a) and 22 (3)(b) of BR Act, 1949. These banks have large accumulated losses and have shown erosion of assets as well as of deposits. Since, allowing these DCCBs to continue banking business would be detrimental to the interest of depositors, Reserve Bank had imposed directions on these banks restraining them from acceptance of fresh deposits with effect from May 9, 2012 and thereafter Show-Cause Notices were issued to them on March 7, 2013

[26] Four scenarios are; i) 50 per cent increase in GNPA (classified into sub-standard advances, ii) 50 per cent increase in GNPA (classified into loss advances), iii) 100 per cent increase in GNPA (classified into sub-standard advances, and iv) 100 per cent increase in GNPA (classified into loss advances).

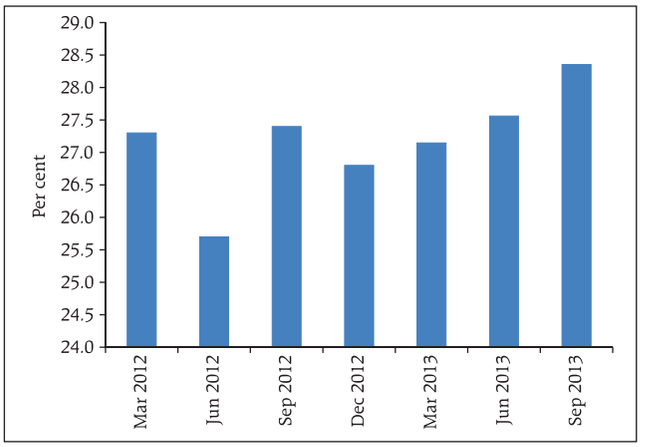
to Show-Cause as to why their licence application to carry on banking business in India should not be rejected. Further regulatory action against these banks is being examined now.

Non-Banking Financial Companies (NBFCs)[27]

Capital Adequacy

2.76 Capital to risk-weighted assets ratio (CRAR) norms were made applicable to NBFCs-ND-SI w.e.f. April, 2007[28], in terms of which every systemically important non-deposit taking NBFC is required to maintain a minimum capital, consisting of Tier-I and Tier- II capital, of not less than 15 per cent of its aggregate risk-weighted assets. The aggregate CRAR of the ND-SI sector stood at 28.4 per cent for the quarter ended September 2013 as against 27.4 per cent in the corresponding quarter of 2012 (Chart 2.31).

Chart 2.31: Trends in Capital to Risk Weighted Assets Ratio

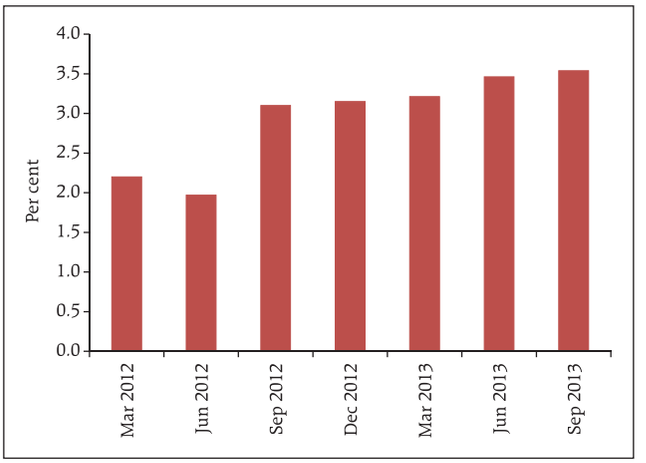


Source: RBI Supervisory Returns

Asset Quality

2.77 The gross NPA ratio of the ND-SI sector stood at 3.5 per cent for the quarter ended September 2013 as against 3.1 per cent for the same quarter in the preceding year (Chart 2.32).

Chart 2.32: Trends in Gross NPA Ratio



Source: RBI Supervisory Returns

Stress Tests - Credit Risk

System level (NBFC-D and NBFC-ND-SI)

2.78 A stress test on credit risk for NBFC sector (includes both deposit taking and ND-SI) for the period ended September 2013 was carried out under two scenarios (i) where gross NPA increased two times and (ii) gross NPA increased 5 times from the current level. It was observed that in the first scenario, CRAR dropped by 1.1 percentage points from 23.5 to 22.4 per cent while in the second scenario CRAR dropped by 4.9 percentage points (CRAR dropped from 23.5 to 18.6 per cent). It may be concluded that even though there was shortfall in provisioning under both the scenarios, the impact on CRAR was negligible as the sector had a higher level of CRAR at 23.5 per cent as against the bench mark CRAR of 15 per cent.

[27] NBFCs-ND-SI (Non-Deposit taking and Systemically Important NBFCs) only used in this analysis.
[28] Vide Notification No. DNBS.193 DG (VL) 2007, dated 22-02-2007

Select NBFCs

2.79 A stress test on credit risk for individual NBFCs for the period ended September 2013 was also carried out under two scenarios, *viz.,* (i) gross NPA increased two times and (ii) gross NPA increased 5 times from the current level. As at the end of September, 2013 around 4.8 per cent of the companies were unable to comply with the minimum regulatory capital requirement of 15 per cent. The percentage of NBFCs, not able to meet the minimum required level of capital adequacy went up to 8.6 per cent and 13.4 per cent under the first and second stress scenarios respectively.

Insurance Sector

2.80 The Insurance Regulatory and Development Authority (IRDA) vide Fifth Amendment to the Investment Regulations during 2013 has taken several policy changes, which include, increasing the scope of investments in AA rated bonds, thrust to investments in infrastructure, controls to protect the policyholders interest, restricting the insurer to invest in bonds which are rated below A to the prescribed percentage, *etc.*

2.81 The total investment of insurance sector increased by 11.1 per cent to ₹18.7 trillion as at end March 2013 from ₹16.8 trillion as at end March 2012, which further increased by 11.6 per cent during first quarter of 2013-14 to ₹19.2 trillion as at end June 2013. The life insurance continues to be contributor in the investment of insurance sector with share of 93.3 per cent as at end June 2013.

2.82 Most of the Non-Performing Assets (NPAs) of insurances sector are with PSU insurers and recorded 82.6 per cent growth on y-o-y basis during 2012-13 to ₹70.1 billion as at end March 2013. Whereas, NPAs of private sector insures was ₹0.1 billion as at end March 2013.

Chapter III

Financial Sector Regulation and Infrastructure

India stands committed to the implementation of the global regulatory reforms and has made considerable progress on this front. Globally, the policies aimed at ending 'too-big-to-fail' have not been entirely successful at the ground level. In India, the process of identification of financial conglomerates and their joint supervision/ regulation has received a lot of attention. Some global reform measures, e.g. those related to shadow banking may need to be adopted selectively, based on their relevance to the domestic financial system. The so called shadow banks in India have a key role in expanding the reach of the formal financial system to the remote corners of the country. Emerging regulatory gaps and scope for arbitrage need to be kept in view, while ensuring a healthy growth of the non- banking financial sector.

Recent instances of manipulation of benchmarks and prices in international financial markets once more brought into focus the role of greed and the failure of self regulation of financial markets. India has set up a committee to review the systems and procedures in place with regard to the major financial benchmarks used in domestic markets.

The initiatives by regulators towards installing centralised databases for large common credit exposures of banks, corporate debentures and insurance policy records are expected to improve the information flow and functioning of the financial system. The work on LEI system is also underway.

The Financial Stability and Development Council and its Sub-Committee have been spearheading the work on systemic risk assessment, financial sector development, inter regulatory coordination, financial inclusion and literacy and implementation of regulations to foster financial stability.

Global Regulatory Reforms

Ending Too-Big-To-Fail

3.1 One of objectives of the reforms after the global financial crisis (GFC) was to develop and implement a policy framework to ensure that systemically-important financial institutions (SIFIs) could be resolved without resorting to taxpayer support and/ or causing disruption to the financial system. The global SIFIs (G-SIFIs) were to be subjected to higher capital requirements and more stringent supervisory standards for risk management, data aggregation, risk governance and internal controls. The national resolution regimes were to be strengthened. As part of G-SIFIs, an initial group of global systemically important banks (G-SIBs) were identified in 2011, using a methodology developed by the Basel Committee on Banking Supervision (BCBS). The G-SIBs have been allocated to buckets corresponding to the higher loss absorbency requirements they would need to satisfy from January 2016.

3.2 The list of G-SIBs is updated every year in November by the Financial Stability Board (FSB) and the BCBS. According to the last updated list published in November 2013, 29 banking groups have been identified as G-SIBs.

Increasing Size of Big Global Banks

3.3 Although firms and markets are beginning to adjust to the regulatory approach towards ending too-big-to-fail (TBTF), research[1] based on bond credit spreads shows lower risk sensitivity for the largest financial institutions indicating continued expectation of sovereign support to such institutions. Even as efforts are under way to end the implicit subsidy

[1] Warburton, A. Joseph and Anginer, Deniz and Acharya, Viral V. (2013), "The End of Market Discipline? Investor Expectations of Implicit State Guarantees", January 1, SSRN: http://ssrn.com/abstract=1961656 or http://dx.doi.org/10.2139/ssrn.1961656.

associated with the SIFIs, the biggest banks have grown even bigger since 2008 (Chart 3.1).

3.4 Size alone does not capture the essence of the problem of TBTF, (*e.g.* the case of government owned banks). The complexity, interconnectedness and substitutability aspects of SIFIs make the problem much more difficult. As the big banks have got bigger, the need for a greater degree of transparency and market discipline has not yet been fully addressed.

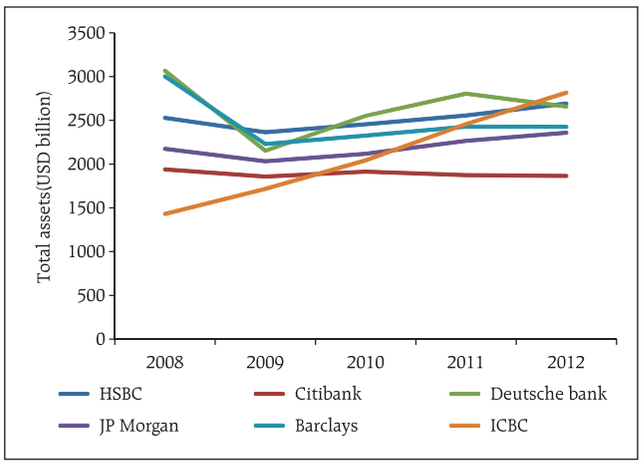
3.5 The present debate on TBTF revolves around the final numbers for higher additional capital ratios for the SIFIs and their implications for credit and growth, with unresolved issues about the use of divergent accounting practices in respect of derivatives and differences in calculation of risk weighted assets. Meanwhile, at a national level, regulators seek to address the risks posed to domestic financial systems by the G- SIFIs by ring-fencing local operations. There is also a growing concern that lobbying by the very large and transnational firms may cause delays in finalising and implementing effective reform measures to address the fundamental issues related to TBTF.

Framework for dealing with India's Domestic Systemically Important Banks

3.6 There is no Indian bank in the list of G-SIBs. The BCBS and FSB have finalised a principles-based, minimum framework for addressing Domestic Systemically Important Banks (D-SIBs).

3.7 The Reserve Bank has released the draft framework[2] for identifying the D-SIBs and the regulatory / supervisory policies applicable to them. The assessment methodology adopted by the Reserve Bank is essentially based on the BCBS methodology, with suitable modifications to capture domestic importance of a bank. The indicators for identification and assessment, proposed in the draft framework are: size, interconnectedness, substitutability and complexity. D-SIBs will be required to have additional Common Equity Tier 1 capital requirement ranging from 0.20 per cent to 0.80 per cent of risk weighted assets. The computation of systemic importance scores will be carried out at yearly intervals.

Chart 3.1: Trends in Total Assets of some big banks during the period 2008-2013



Source: The Banker database and websites of banks

Shadow Banking

Divergence in Size and Profile

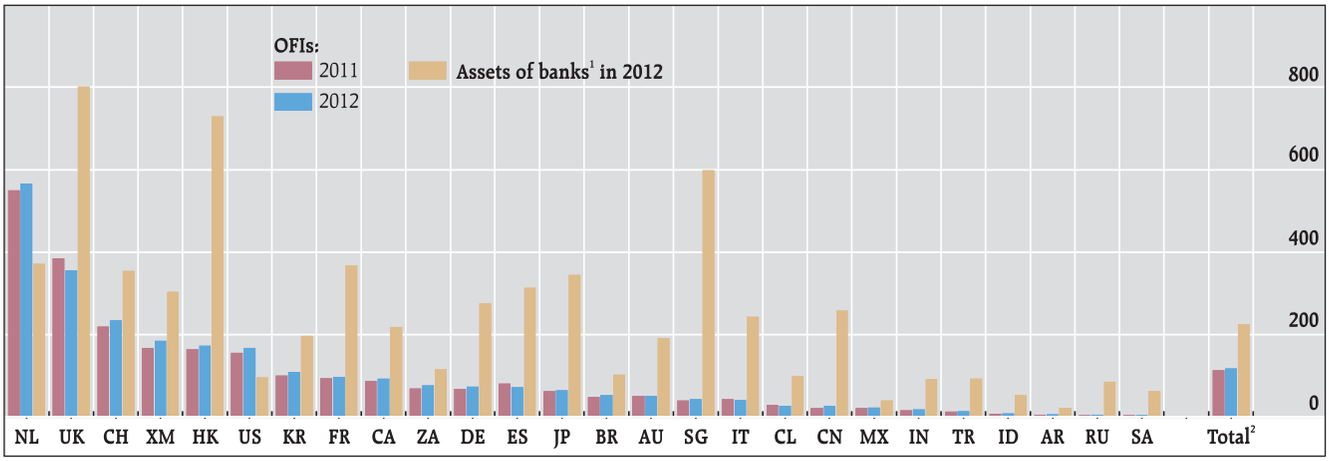
3.8 In its annual shadow banking monitoring exercise, the FSB uses "Other Financial Intermediaries" (OFIs) as a conservative proxy for the size of shadow banking. The OFIs include all Non- Banking Financial Institutions (NBFIs) except insurance companies, pension funds or public sector development financial entities. While, globally, the average share of OFI assets is about 24 per cent of GDP, there are significant variations in the size for individual jurisdictions (Chart 3.2).

3.9 For a number of emerging market economies, non-bank financial intermediation remained relatively small, compared to the level of GDP. On average, the size of non-bank financial intermediation in terms of assets was equivalent to 52 per cent of the banking

[2] RBI (2013b), "Draft Framework for dealing with Domestic Systemically Important Banks (D-SIBs)",December 2 (http://rbi.org.in/scripts/bs_viewcontent.aspx?Id=2766)

Chart 3.2: Size of non-bank financial intermediaries

(As a percentage of GDP, by jurisdiction)



AR = Argentina; AU = Australia; BR = Brazil; CA = Canada; CH = Switzerland; CN = China; CL = Chile; DE = Germany; ES = Spain; FR = France; HK = Hong Kong; ID = Indonesia; IN = India; IT = Italy; JP = Japan; KR = Korea; MX = Mexico; NL = Netherlands; RU = Russia; SA = Saudi Arabia; SG = Singapore; TR = Turkey; UK = United Kingdom; US = United States; XM = Euro area; ZA = South Africa.

[1] Note that 'banks' refer to the broader category of 'deposit-taking institutions'. [2] 20 jurisdictions and euro area.

Sources: FSB Shadow Banking Monitoring Report –November 2013 (Based on National flow of funds data; other national sources; IMF)

system with cross-country differences, ranging from below 10 per cent in some emerging economies to 174 per cent in US at the end of 2012.

3.10 In India and certain other economies like Turkey, Indonesia, Argentina, Russia and Saudi Arabia, the non-bank financial assets remained below 20 per cent of GDP at the end of 2012. However, the sector showed rapid growth, though from a low base, in some of these jurisdictions, including India. While the growth trends need to be monitored, the role and characteristics of NBFIs in most developing countries are different from those in advanced economies. They are predominantly domestic in focus with minimal cross-border activities/risks, support financial inclusion and are subject to regulatory oversight.

3.11 In the Indian context, the Non Banking Finance Companies (NBFCs) are regulated by the Reserve Bank and all types of Mutual Funds (MFs) are regulated by the SEBI. As such India doesn't have shadow banking entities, in the formal financial system, with potential for creating systemic instability. However, a large number of non-bank financial entities function in the unorganized sector (unincorporated entities – outside the purview of regulatory perimeter), whose collective size and profile of activities need to be gauged to ensure that they do not pose any threat to the 'trust' in and 'stability' of India's financial system.

Regulatory Arbitrage – NBFCs and Cooperative Societies

3.12 There is also a need to plug the regulatory gaps to stop financial entities from changing their 'form' for the implicit purpose of avoiding regulations, as was seen in a recent episode involving a company converting itself into a cooperative society to escape the rules relating to its fund raising and other activities. There are stringent norms for granting Certificate of Registration for NBFCs which are permitted to accept public deposits. The companies are thereafter subject to monitoring and may be restricted from accepting deposits if their financial position weakens. The Reserve Bank also prescribes limits on the quantum of deposits that can be accepted by an NBFC. The requirement of minimum capital and other financial parameters are more relaxed or non-existent in cases of cooperative societies. The cooperative credit societies which provide financial accommodation to their members also accept deposits from members as an activity

incidental to their core activity. The quantum of these deposits is not regulated as in the case of NBFCs. The rate of interest which can be paid on public deposits accepted by NBFCs is regulated by Reserve Bank. However the interest rate offered by cooperative societies is not regulated or capped by any regulation.

Money Market Mutual Funds – Interconnectedness with Banks

3.13 The previous FSR had mentioned that Money Market Mutual Funds (MMMFs) with constant Net Asset Value (NAV) were not permitted in India. However, the strong interconnectedness among banks and mutual funds has been a cause for concern. Debt mutual funds account for 70 per cent of the assets under management (AUM).

3.14 These mutual funds had experienced difficult liquidity conditions during the global financial crisis and SEBI had taken various regulatory measures *viz.* restriction on investments in certain instruments, changes in valuation norms, provisions regarding uniform cut-off timings for applicability of NAV *etc.* With low levels of retail participation, the MMMFs continue to rely on investment by banks, corporates and other institutional investors.

3.15 Due to their interconnectedness with banks, liquidity pressure is felt by the MMMFs whenever redemption requirements of banks are large and simultaneous. The liquid debt mutual funds are large lenders in the over-night markets such as collateralized borrowing and lending obligation (CBLO) and market repo, where banks are large borrowers. Various schemes of mutual funds also invest heavily in certificates of deposit (CDs) of banks. Such circular flow of funds between banks and mutual funds is a source of systemic instability in times of stress/ liquidity crunch, *etc.* In view of these concerns, banks' investments in liquid / short term debt schemes of mutual funds was restricted to 10 per cent of their net worth[3], effective July 2011.

3.16 Debt mutual funds in India had seen large inflows during 2012-13, from foreign institutional investors (FIIs) during the first five months of calendar year 2013, due to the higher returns offered. The depreciation of the Indian rupee in response to the announcement of tapering by the Fed earlier this year led to large scale sell off by FIIs of debt securities during the month of June 2013.

3.17 As a result of Reserve Bank's measures on tightening of liquidity during July 2013, investments by banks as a percentage of total AUM of liquid/money market schemes declined (from 21.14 per cent on 15 July 2013 to 13.02 per cent as on 16 July 2013, which further declined to 7.77 per cent as on 31 July 2013). With a view to pre-empt any liquidity crisis for mutual fund industry SEBI and RBI took measures like enhancement (on case to case basis) in the borrowing limit of mutual fund schemes and a Special Reserve Bank Re-Finance Window to commercial banks for meeting the liquidity requirements of the mutual funds industry. However, these facilities were not actually availed, showing improvement in liquidity management by MFs even in the face of heavy redemptions.

Financial Markets: Infrastructure and Development

'Fixing' in International Financial Markets

3.18 Recent reports of manipulation of benchmark reference rates and prices in international foreign exchange markets and spot oil markets and investigation by authorities in major developed jurisdictions have once again brought to focus concerns regarding the efficacy of self-regulation in financial markets. Some of the largest international banks have been penalised heavily for their role in the irregularities. It appears that the disproportionately large share in trading enjoyed by a few large players allows them to use the information asymmetry to their advantage at the cost of smaller players. The investigations also highlight the role of ethics in

[3] Investment by banks in liquid/short term debt schemes of mutual funds (http://rbi.org.in/scripts/NotificationUser.aspx?Id=6602&Mode=0)

finance and the inherent limitations of regulation to pre-empt manipulation by market players of the rules on which the whole edifice of global financial markets rests.

Review of Benchmarks in Indian Financial Markets

3.19 The benchmark setting process and governance mechanisms in case of major Indian financial benchmarks, mainly FIMMDA-NSE MIBOR (interest rate benchmark) and RBI Reference Rate (forex benchmark), have been observed to be robust. Although there have been no major instances of manipulation of market rates in India's domestic markets, the Reserve Bank has constituted a committee to conduct a review of the systems and procedures in place with regard to major financial benchmarks in India.

3.20 The MIBOR is calculated from the polled rates from a select panel of 30 banks/primary dealers, using bootstrapping technique and the mean corresponding to the lowest standard deviation is taken as the fixing rate for the day. The bootstrapping method facilitates random drawing of multiple data sets which guards against the possibility of cartelisation and of extreme observations influencing the fixing rate. The condition requiring a specified minimum number of quotes after trimming mitigates the risk of loss of information due to excessive trimming. Moreover, the biggest safeguard against manipulation of overnight MIBOR fixed by NSE through polling has been the existing system of transparent execution of more than 90 per cent of the inter-bank money market trades on NDS-CALL platform and dissemination of the traded rates (of the trades executed on NDS-CALL as well as outside NDS-CALL) in the public domain.

3.21 For the forex benchmarks, the Reserve Bank computes and disseminates the exchange rate of the Indian Rupee against US Dollar and Euro on a daily basis. The process is reviewed periodically in view of the changing dynamics of the domestic foreign exchange market and other factors like its growing linkages with the offshore market. As a result of changes brought into effect in April 2010, the number of banks in the polling panel was significantly expanded, of which a set of banks are selected randomly every day for obtaining quotes. Further, the reference time window was expanded to 30 minutes (1145 IST to 1215 IST) from the earlier 15 minutes, of which a five minute window is selected randomly every day for conducting polling. As bulk of USD/INR inter-bank spot trades are done on Reuters dealing platform and not on telephones, the actual traded rates are available almost instantly which are also compared with the polled rates to ensure that the polled rates are not significantly different from the actual dealt rates.

Issues in Indian Fixed Income and Derivatives Markets

3.22 India's domestic markets for interest rate derivatives, despite an existence of two decades have not taken off, due to the absence of some of the basic building blocks[4]. Since derivatives are priced through replication portfolios, two building blocks are required to be in place. First, reasonable asset market liquidity and second, a transparent funding curve against which the market makers in the derivatives market can lend or borrow. Even if the asset market liquidity is taken as exogenous, the absence of a funding curve induces pricing inefficiency in the derivatives segment. Even though banks generally have significant appetite for unsecured term borrowing (as the market in CDs as well as borrowing through bulk deposits from institutional corporate participants for shorter tenors show), an inter-bank term lending benchmark has not yet developed.

3.23 Delivery based Interest Rate Futures (IRFs) suffer from inherent limitations owing to non-uniform liquidity in the underlying deliverables affecting the price discovery of the product. However, as per the recent guidelines issued on December 5, 2013, all the IRFs will now be cash settled (91days, 2yr & 5yr and 10yr). 10yr IRF will have both cash settled and delivery based options.

3.24 While some issues like narrow institutional ownership, low retail participation and domination of on the run securities have affected the liquidity in Government securities market, the G-Sec market liquidity has improved over the years and in May, the average daily volume had clocked the ₹1 trillion mark. The anonymous electronic trading platform and CCP based clearing for all G-Sec trades (including OTC) have provided a great fillip to the market liquidity. It is observed that the market liquidity in the present Indian context is more a function of interest rate movements and inflation/interest rate outlook than of structural factors.

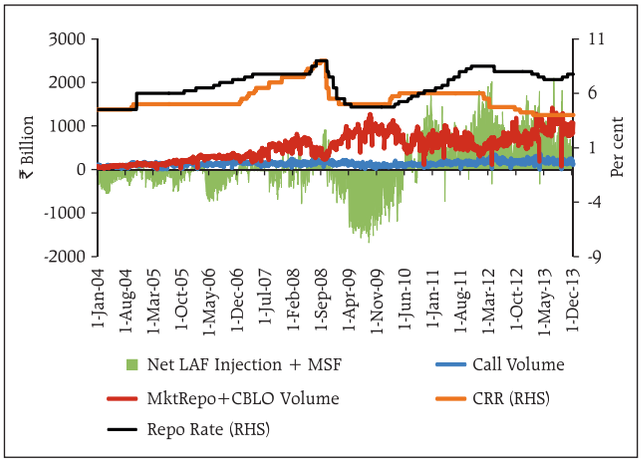
3.25 As regards, development of a term money market, there are non-trivial operational issues that are required to be resolved (like benchmark based on secondary market CD trades or primary issuances, cohort of banks) prior to finalising the design of the benchmark. While multiple swap curves based on floating rate indices (currently the individual "base rates" of banks) are symptomatic of market inefficiency, *inter-se* trading between OIS and the term Interest Rate Swap (IRS) curves is likely to erase any *arbitrageable* differential.

3.26 While the recent initiative of Reserve Bank to offer term repo facility is expected to develop a term money market curve, introduction of money market futures on the lines of Euro dollar futures would hasten *inter-se* convergence between curves but introduction of the money market futures should ideally follow establishment of term benchmarks and not the other way round. The liquidity in interest rate derivatives segment as well as government securities segment is likely to be positively affected if non-bank participants enter the fray. Such participants are relatively immune to accounting methodology applicable to banks and hence can winnow out arbitrage opportunities.

Liquidity Management in Banks

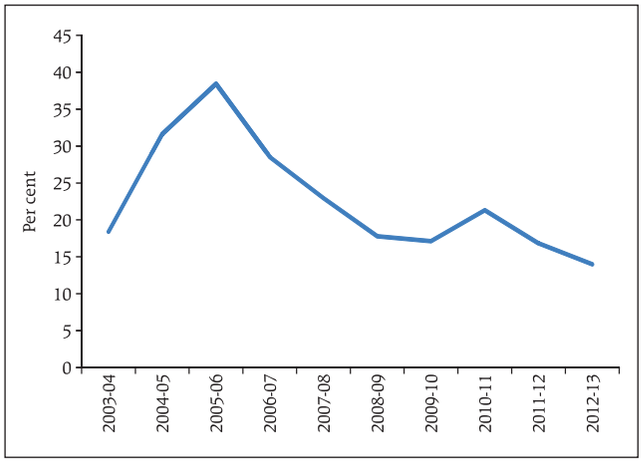
3.27 The Indian banking system has been persistently borrowing from the Reserve Bank window starting mid-2010 (Chart 3.3), suggesting that banks have become dependent on central bank support in meeting their structural funding deficits. Prior to mid-2010 banks borrowed only occasionally from the Reserve Bank despite high credit growth (Chart 3.4).

Chart 3.3: RBI Liquidity Injections and Money Market Volumes



Data: Updated till December 12, 2013
Source: RBI and CCIL

Chart 3.4: Non-food Credit Growth

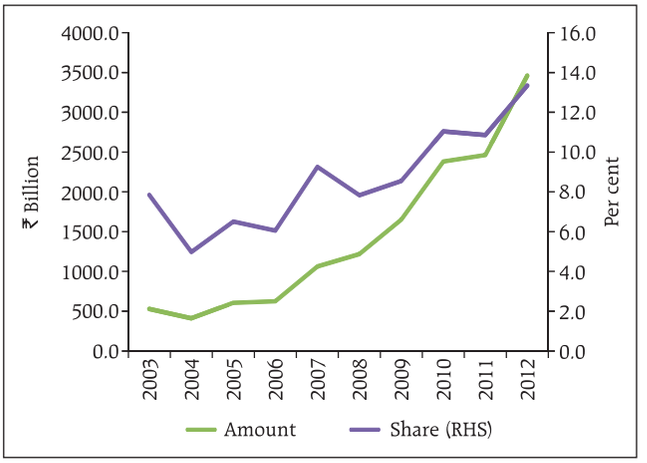


Source: RBI

[4] Indranil Chakraborty and R Ayyappan Nair, "Imperfections in Indian fixed-income derivative markets - Plausible rationale", *Unpublished RBI Working Paper*

In addition, RBI's holding of GoI securities have also been increasing (Chart 3.5). During the period covered (2004-2013) volumes in overnight unsecured interbank market (call money market) remained broadly unchanged indicating constraints for the overnight unsecured interbank market (an important bench mark market, otherwise) to grow.

Chart 3.5: RBI's Holdings of Central Government Securities



Source: RBI

Move for Reorientation of India Banking System

3.28 In recognition of the need for reviewing the existing structure of Indian banking system, in terms of its size, capacity, ability to meet divergent needs for credit and banking services, access and inclusiveness; the Reserve Bank has initiated a discussion[5] on various aspects of intended reorientation of the banking system. The identified building blocks for the revised banking structure in India seek to address issues such as enhancing competition, financing higher growth, providing specialized services, and furthering financial inclusion. The discussion paper also seeks to emphasize the need to address the financial stability concerns arising out of the suggested changes in banking structure.

Risk Based Supervision (RBS) for Banks

3.29 Based on the recommendations of the High Level Steering Committee (HLSC), Reserve Bank has finalised a supervisory framework named as SPARC (Supervisory Programme for Assessment of Risk and Capital) under RBS. As part of RBS phase I rollout, 29 banks have been brought under the framework from the financial year 2013.

3.30 The revised framework underscores a comprehensive evaluation of both present and future risks, identification of incipient issues, determination of a supervisory stance based on the evaluation and facilitating timely intervention and corrective action. This would mark a considerable shift from the present CAMELS/ CALCS[6] methodology, which is a more compliance-based and transaction testing (point-in-time) oriented. The revised supervisory strategy under RBS would be more off-site oriented combined with need based, risk based, focused on site inspections.

Central Repository of Large Common Exposures of Banks

3.31 Information asymmetry is a fundamental challenge which affects the debtor-creditor relationship. Debtors are more informed about their financial standing than the creditors who evaluate whether to extend credit to the debtors. In this context, the Reserve Bank initiated a proposal of creating a central repository of large credits to track large common exposures across banks. The database is proposed to be shared with the banks to enable banks themselves to be aware of leverage and common exposures. Accordingly directives were issued to banks on September 11, 2013 under Section 27(2) of the Banking Regulation Act 1949 to operationalise the credit repository of large exposures.

[5] RBI (2013a), "Discussion Paper on 'Banking Structure in India – Way Forward", September 23 (http://www.rbi.org.in/scripts/BS_PressReleaseDisplay.aspx?prid=29614)

[6] CAMELS (Capital Adequacy, Asset Quality, Management, Earnings, Liquidity, Systems & Controls) approach for domestic banks; CALCS (Capital Adequacy, Asset Quality, Liquidity, Compliance, Systems & Controls) approach for foreign banks

3.32 The information supplied by the banks on their funded and non-funded exposures to large individual/ corporate borrowers (*i.e.*, the borrowers with credit limit of ₹100 million and above from the banking system) is proposed be used to create the credit registry. The uniqueness of the borrowers is proposed to be captured through the Permanent Account Number (PAN) reported by the banks which will be cross verified from the Income Tax Authority to the extent possible. Borrowers, not having a PAN, will be allotted unique identification number only for the purpose of reporting in the return. Other information to be captured as part of the credit registry include name of the borrower, industry, sector, rating details, facility wise funded and non- funded exposures, limits, *etc.* An online query module is being offered to the banks, through which they can view any individual large borrower's asset classification- wise total funded and non- funded exposures to the banking system. The information on large common exposures will be shared with banks only on an aggregate basis without disclosing the names of the banks with which the borrowers have banking relationship.

Centralised Database for Corporate Bonds/ Debentures

3.33 Similarly, for the corporate securities markets, while the information in respect of bonds/debentures issued by various issuers is available in a fragmented manner, need was felt for a comprehensive database on corporate bonds. SEBI has initiated action for setting up of 'Centralised Database for Corporate Bonds/Debentures' by mandating both the depositories *viz.* NSDL and CDSL to jointly create, host, maintain and disseminate the centralized database of corporate bonds/debentures. The depositories will obtain requisite information regarding the bonds/ debentures from Issuers, Stock Exchanges, Credit Rating Agencies and Debenture Trustees. All the intermediaries will be required to update the database on ongoing basis, which can be accessed by the public free of charges.

Insurance Repository System

3.34 In India risk is not just covered by an individual's contributions to insurance but also by contributions from employers, banks and cooperative societies, for instance, on behalf of their employees, customers and members, respectively. It becomes difficult for an insured individual (and for the dependents / beneficiaries) to track and list these insurance policies and secure them at a safe and easily retrievable place. Even with the use of technology, visiting multiples offices of the insurance companies or logging requests/ making premium payments through multiple portals of the insurance companies have been posing difficulties to the policyholders.

3.35 The Insurance Regulatory and Development Authority (IRDA) had conceived an initiative to de-materialise the Insurance policies and enable electronic issuance and maintenance of the insurance policies. IRDA has authorised five entities to act as 'Insurance Repositories', to enable storage and retrieval of electronic policies. These repositories are otherwise unrelated to Insurance companies and are empowered to meet certain policy servicing requirement. The initiative would enable electronic issuance of insurance policies and it is also possible to convert previously held insurance policies into electronic form through an electronic insurance account (eIA).

3.36 The eIA is offered free of cost to the policyholder and will hold the insurance policies in an electronic form and provides safe custody of insurance policies issued by various Insurance companies. Majority of the service requests can be placed with the Insurance Repositories who will facilitate the delivery of the service by the Insurance companies. The policyholder is relieved from the trouble of visiting offices of multiple insurance companies for the purpose of requests like change of address/nomination *etc.* The model allows appointment of 'Approved persons' who are easily approachable and accessible even to the rural policyholders. The eIA holder can appoint an

'Authorised representative' who can operate the account in case of death or disability of the policyholder to facilitate the nominees/assignees in claiming the benefits under the insurance policies. The Insurance Repositories provide a periodic statement to the policyholder with the status of all the insurance policies held under an eIA.

3.37 The initiative of 'Insurance Repositories' currently is launched on a pilot basis for life insurance and will soon extend to other lines of business including Annuities, Group and General Insurance policies. Owing to the scale, the Insurance Repositories promise to bring down the cost of policy servicing thus enabling the Insurance companies to achieve efficiencies that possibly reduce the premiums and the turnaround times in delivering services.

Progress on LEI System for India

3.38 As reported in the previous FSR, the Reserve Bank had joined the Regulatory Oversight Committee of the global Legal Entity Identifier (LEI) system in January 2013, recognising its importance for the Indian financial system.

3.39 A Steering Committee consisting of representatives from the Reserve Bank, Ministries of Finance and Company Affairs, SEBI and IRDA has been set up to guide the process of implementation of the LEI in India.

Regulation and Consumer Protection

Regulatory Gaps – Electronic Spot Markets in Commodities

3.40 The recent payment and settlement crisis at the National Spot Exchange limited (NSEL) highlighted, among other things, a gap in the regulation of the commodity spot exchanges in India. Initiatives to launch commodity spot exchanges in India are of relatively recent origin. Setting up of such exchanges was facilitated in the mid-2000s in response to a felt need that a sustained and healthy development of futures market was contingent upon the simultaneous development of the physical or spot market for commodities. In order to provide adequate liquidity on the trading platforms, Government of India permitted the electronic spot exchanges a facility of offsetting (cash settlement) the contracts on the day of entering into contracts, but it also mandated that if the contracts were not offset (cash settled) on the same day, they would have to compulsorily result in delivery of goods. The one-day forward contracts traded on spot exchanges were exempted from the provision of the FCRA, with stiff conditions including a ban on short selling and the launch of longer term contracts.

3.41 Detailed investigations into the various malpractices at NSEL have revealed the need for comprehensively addressing the problems in commodity spot markets in India. The FMC has been brought under the ambit of the Ministry of Finance, Government of India, to ensure better co-ordination among various financial sector regulators.

3.42 The fallout of the events in the NSEL on other exchanges / markets was limited. However, the episode revealed certain systemic concerns with regard to ownership and governance arrangements in exchanges and common ownership of exchanges and existing technology platforms. The episode has emphasized the need for ensuring that no single shareholder or a group of shareholders is permitted to dominate the functioning of the exchange or exercise management control.

Frauds and Customer Complaints in Banking System

3.43 While number of fraud cases have shown a decreasing trend from 2009-10 to 2012-13, the total amount involved in cases of frauds has increased substantially over this period (Chart 3.6).

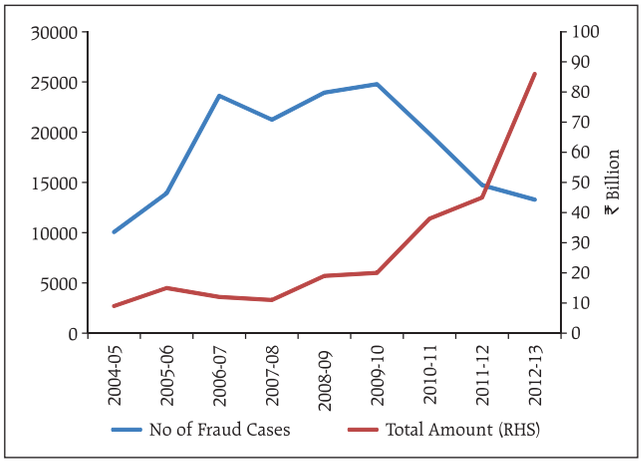
3.44 It is observed that the number of cases of large value frauds (involving amount of ₹500 Million and above) has increased significantly over the last 3 years- from 3 cases in FY 2009-10 to 45 cases during 2012-13, with an even more alarming increase in terms of total

amount involved in such cases. The rise in incidences of frauds in large value loan accounts, is a concern and concerted action to improve checks and balances and deterrent action will be required to tackle the problem.

3.45 Online frauds, lottery SMS alerts, advertisements inducing customers to share the details of bank accounts, cloning of cards *etc.* pose a real challenge for the banks and customers alike in matters of safety and security. Banks need to evolve a comprehensive policy with regard to online banking services, by focusing on compensation, insurance and / or a limited liability clause.

3.46 The Reserve Bank has taken certain measures like introducing compensation for delay in payments of pension. Some other recommendations of the Committee on Customer Service in Banks with regard to payment of pension have also been implemented. The customer complaints redressal system at banks needs strengthening considering their link with operational risk.

Chart 3.6: Trends in Cases of Frauds
(Number and Amount)



Rising Trend in Mis-selling in Insurance products

3.47 The previous FSR had raised the risks from mis-selling of insurance products. The complaints under mis-selling have registered a rising trend in recent years (Table 3.1). While mis-selling is not defined in the any of the legislations or regulations governing insurance business, it broadly refers to unfair or fraudulent practices adopted at the time of soliciting and selling insurance policies which have not been sought by the customer or where the customers feel that the policies sold are different from what they wanted or what they were promised. Increasing number of complaints of mis-selling may affect the confidence of general public in insurance products, intermediaries and insurance companies.

3.48 Complaints of mis-selling could impact the continuation of policies affecting the cash flows of insurance companies. More importantly, it seriously affects the demand for insurance which could have

Table 3.1: Trends in Complaints of Mis-selling

Particulars	2013-14 (up to Sep 30, 2013)	2012-13	2011-12
Complaints on unfair business practices	109419	157688	91298
Total complaints	185769	322810	295196
Per cent of total complaints	58.90	48.85	30.93

serious implications on insurance as an avenue of tapping savings for long term investments for the economy.

Regulatory Measures to Check Mis-selling of Insurance Products

3.49 The IRDA (Protection of Policyholders Interests') Regulation, 2002 provides the framework for protection from mis-selling through the requirements to be met at point of sale, proposal, sale and servicing of insurance products emphasizing on complete disclosures. There is an option of 'free look cancellation' within 15 days of receiving the policy document. Misleading publications for soliciting or selling of policies are prohibited under the IRDA (Insurance Advertisements and Disclosure Regulations), 2000. Regulations for licensing of insurance intermediaries like agents, corporate agents and brokers and prescribed code of conduct for their operations are aimed at ensuring that intermediaries do not resort to unfair practices. Guidelines on distance marketing by insurers and intermediaries provide for protection of prospects even if the solicitation or sale is not made in person but through alternate channels like phone, email or internet. Regulations relating to standard proposal form are aimed at better underwriting before sale of policies by analyzing the need of prospect before sale of policies. The improvements in products and disclosures, especially in unit linked policies, are also aimed at providing customers with full information to enable them to make an informed choice.

3.50 IRDA has the power to take regulatory action against insurers and intermediaries which include imposition of fine, issuance of warning, suspension of license and cancellation of license and IRDA has been increasingly using these powers to check mis-selling. Apart from the regulatory framework and powers, the mechanisms for supervision, corporate governance, grievance redressal and consumer education are also aligned to check the unfair business practices like mis-selling.

Trends in Pledging of Shares by Promoters

3.51 The pledging of shares by promoters of Indian companies has been an old practice, but earlier the information was not made publicly available. In 2009, SEBI had mandated event based disclosures, which must be made as and when the shares are pledged and periodic disclosures along with quarterly filings with stock exchanges.

3.52 Pledging of shares by promoters is perceived as a significant activity with many implications for risks to the markets, especially when the funding markets face tight conditions. Usually, a high percentage of promoter shareholding is seen as positive since it indicates the faith of the promoters in the business and any dilution in the stake of promoters is perceived as diminishing confidence of promoters. It has been observed that the equity prices of the companies in which the promoters had pledged significant portions of their shares, tend to fall faster than the broader correction in the market. The shares of such companies might have been influenced, apart from other factors, by the risks related to the perceived difficulty in meeting the margin calls triggered by the decrease in the market price of shares.

3.53 Pledging of shares by promoters could pose as a concern in both, falling or rising market scenarios, when large scale pledging of promoter equity could pose concerns for retail investors' wealth. In a falling market, pledged shares would be under pressure as diminished share prices can turn the collaterals cheaper, prompting lenders to either demand additional margins or sell shares in the open market to protect their interests. Either action could have a cascading impact on stock price, thereby eroding investor's wealth. The said risk is less in a rising market. In a rising market, the concerns arising out of a downside in collateral value are lesser. However, pledging has a destabilising effect on shareholding pattern. Also, promoters who pledge shares in a rising market could be at a high risk when a bearish trend sets in.

3.54 In an analysis carried out by SEBI, based on Capitaline database, it was observed that in case of 4274 listed companies[7], promoters had pledged some or all their shares in those companies. It was seen that out of these, in the case of 286 companies the promoters had pledged more than 50 per cent of their share holding. These 286 companies are grouped into high, medium and low risk categories, based on number of shares pledged by promoters in proportion to the total outstanding shares of the company (Table 3.2).

3.55 The analysis of 202 companies (which were considered as high risk and medium risk companies from the short listed set of 286 companies), after categorising them according to their market capitalisation levels shows that 91 per cent of the high risk and medium risk companies *i.e.* 183 companies fall under the small cap category and remaining 9 per cent of the high risk and medium risk companies (Table 3.3). Thus a small number of companies under the large cap and mid cap category need to be considered as potential cases for initiating further examination of the trends in pledging of shares by promoters and implications for the wider market.

Table 3.2: Distribution of Companies against Proportion of Pledged Shares (Size-wise)

Shares pledged by promoter group as a % of Total shares of the company	Category of Risk	Companies where share pledged > 75% of Promoters' holdings		Companies where share pledged between 50% -75% of Promoters' holdings		Total Companies
		In Nos.	In %	In Nos.	In %	In Nos.
Above 50%	High	39	25	9	7	48
Between 25% to 50%	Medium	81	53	73	55	154
Less than 25%	Low	34	22	50	38	84
Total		**154**	**100**	**132**	**100**	**286**

Table 3.3: Distribution of Companies against Proportion of Pledged Shares (Risk-wise)

Categorisation of companies based on market capitalisaton	High Risk Companies		Medium Risk Companies		Total Companies	
	In Nos.	In %	In Nos.	In %	In Nos.	In %
Large Cap (Above ₹100 billion)	1	2	1	1	2	1
Mid Cap (Between ₹20 billion and ₹100 billion)	6	13	11	7	17	8
Small Cap (< ₹20 billion)	41	85	142	92	183	91
Total	**48**	**100**	**154**	**100**	**202**	**100**

Financial Stability and Development Council

3.56 The Financial Stability and Development Council (FSDC) and its Sub Committee deliberated on various aspects that impinge on financial stability - macroeconomic scenario, both global and domestic and the developments in financial markets. After the publication of the last FSR, the FSDC met once while two meetings of FSDC Sub Committee were held during this period. Some of the other important items taken up for discussion at the FSDC and its Sub Committee include: increased volatility in FX markets and the financing of the current account deficit in the face of sudden reversal of capital flows; the risks to the banking sector on account of deteriorating asset

[7] Companies which file the share holding pattern details filed by the with the Bombay Stock Exchange (BSE)/ National Stock Exchange (NSE)

quality; the extra-territorial aspects of regulations by European Securities and Markets Authority (ESMA) and US Commodity Futures Trading Commission (CFTC); trends in bancassurance business with specific reference to single premium policies, *etc.* In addition, the Sub Committee reviewed issues relating to inter regulatory co-ordination *viz.*, a proposal to facilitate settlement of equity market transactions in central bank money (pursuant to an FSAP recommendation), permitting banks to act as brokers for insurance companies, *etc.*

National Strategy for Financial Education

3.57 The implementation of National Strategy for Financial Education (NSFE) which was prepared under the aegis of the Sub Committee (and was covered in detail in the December 2012 FSR) has commenced. A website for the National Centre for Financial Education[8] (which acts as the nodal agency for implementation of NSFE and is supported by all the financial sector regulators) has been launched. Financial inclusion and literacy efforts were further strengthened with initiatives like financial inclusion plans for various segments of the financial sector on the lines of those for banks; nation-wide financial literacy survey; national financial literacy assessment test for students of classes VIII to X; and financial literacy curriculum for schools.

Technology and Financial Markets

Securing financial transactions in India

3.58 Cyber attacks are being seen as a potentially high risk area with increasing use of Internet Banking, and Mobile Banking for financial transactions (Box 3.1). In view of rising incidents of cyber attacks and implications for financial stability as a whole, there is need for banks to take up protective and proactive measures. Information security awareness

Box 3.1: Cyber Security and Cyber Crimes: International Approach

The risks of security of the internet and integrity of information and processes in the cyber world have become critical in ensuring a smooth functioning of financial systems, as for other aspects of economic, social and political life. Although, as concluded by some reports[9], very few isolated cyber-related events have the capacity to cause a global crisis, there is a need to make detailed assessments of risks and preparations to withstand and recover from a wide range of unwanted cyber events, both accidental and deliberate. The Research Department of the International Organisation of Securities Commission (IOSCO), jointly with the World Federation of Exchanges Office, has conducted a cyber-crime survey[10] to bring attention towards the threats from cyber-crimes to some of the most critical financial market infrastructures - the world's exchanges, from the perspective of securities market.

Cyber-crimes can be understood as an attack on the confidentiality, integrity and accessibility of an entity's online/computer presence or networks – and information contained within. The catastrophic single cyber-related events could include successful attack on one of the underlying technical protocols upon which the Internet depends and a very large-scale solar flare which physically destroys key communications components such as satellites, cellular base stations and switches. The risks from other types of breaches of cyber security such as malware, distributed denial of service, espionage, and the actions of criminals and hackers are expected to be

(Contd...)

[8] www.ncfeindia.org

[9] "Reducing Systemic Cyber-security Risk": OECD/IFP Project on "Future Global Shocks" By Peter Sommer, Information Systems and Innovation Group, London School of Economics Ian Brown, Oxford Internet Institute, Oxford University

[10] Cyber-crime, securities markets and systemic risk: Joint Staff Working Paper of the IOSCO, Research Department and World Federation of Exchanges, Author: Rohini Tendulkar (IOSCO Research Department) Survey: Grégoire Naacke (World Federation of Exchanges Office) and Rohini Tendulkar

(...Concld.)

both relatively localised and short-term in impact. The cyber attacks by 'attack vectors' which are not reflected in available preventative and detective technologies, with the ability to produce new attack, pose the biggest challenge in this regard.

Although, computer systems which are stand-alone or communicate only over proprietary networks are safe from malware, they are still vulnerable to management carelessness and insider threats.

In case of cyber space, the defence has to concentrate on resilience – preventive measures plus detailed contingency plans to enable rapid recovery when an attack succeeds as it is often very difficult to identify the actual perpetrator because the computers from which the attack appears to originate will themselves have been taken over and used to relay and magnify the attack commands.

It is important to carry out a detailed threat assessment of any specific potential cyber threat based on possible triggering events, likelihood of occurrence, ease of implementation, immediate impact, likely duration, recovery factors *etc.* As large sections of critical national infrastructure may not be under full and direct government control, there is a need for a clear policy for overall public security and safety from cyber crimes.

Apart from the need for action by the government towards having a comprehensive policy framework for national cyber security, spreading awareness, developing forensic resources and research and international cooperation; the respective financial sector regulators and standard setting bodies also need to design, update and implement regulations and standards for security of operations from cyber crimes / attacks, with special emphasis on promoting information sharing.

among various stakeholders is critical for the banks to secure their information and information infrastructure.

3.59 Securing electronic transactions through the medium of cards is necessary to ensure confidence and faith in such payments. The Reserve Bank has issued directions to the banks to ensure security of such transactions by mandating an additional factor of authentication for all Card not present transactions (Ecommerce/IVR/Mail Order Telephone Order (MOTO)) and Card present (ATM & POS). The Reserve Bank has also advised the banks to move to EMV Chip & PIN technology for customers who have used their cards at international locations and for issuance of new cards wherein the customer has demanded a card for international usage. Directions have also been given to banks to secure the internet banking transactions and also to provide online alerts to the customers irrespective of the value of transaction for usage of cards at any delivery channel.

Cyber Security of India's FMIs under SEBI

3.60 In the previous FSR it was mentioned that systems and processes instituted at the FMIs have stood them in good stead in the past. However, given the dynamic nature and novelty in data thefts and frauds, FMIs need to constantly upgrade and review their processes and systems to prevent any data theft or security failure. Pursuant to IOSCO Report, the FMIs have reported that they broadly carried out necessary upgradation of their systems and processes.

3.61 In light of the findings of the survey report on "Cyber-Crime, Systemic Risk and Global Securities Markets", SEBI registered FMIs (exchanges and depositories) acted proactively and already built in r*eactive and proactive defences* along with *detection control and disaster recovery* to strengthen cyber security in their systems.

Payment and Settlement Systems

3.62 The payment and settlement system infrastructure in the country continued to perform without any major disruptions. There were no noteworthy exceptions observed during the Business Continuity Plan / Disaster Recovery (BCP/DR) Drills carried out in July 2013, which covered live operations of Payment and Settlement Systems applications *i.e.*

Real Time Gross Settlement System (RTGS) and Core Banking Solution (CBS) drill. No significant downtime was experienced in the major payment and settlement systems over the last six months, as observed from the DR drills and Vulnerability Assessment and Penetration Testing (VAPT) conducted by 47 Public and Private sector banks for two quarters (April-June 2013 and July-September 2013).

Trends in Real Time Gross Settlement System (RTGS)

3.63 The RTGS system was implemented in March 2004 in the country. The new RTGS system with advanced features was operationalised from October 19, 2013. The new RTGS system uses extensible mark-up language (XML) based messaging system conforming to ISO 20022 standards. A new feature which has been made operational from the day the system went live is the 'automated gridlock resolution mechanism'. The new RTGS has incorporated some other features with potential for significant improvements in the stability of the system as well as efficiency.

Status of compliance with PFMIs

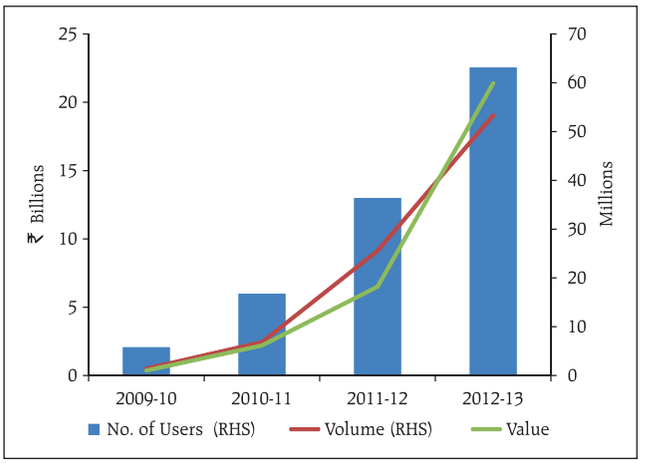
3.64 As part of the Committee on Payment and Settlement Systems (CPSS) and FSB, the Reserve Bank is committed to implement the CPSS-IOSCO "Principles for Financial Market Infrastructure" (PFMIs). A policy document on Regulation and Supervision of Financial Market Infrastructures has been released by Reserve Bank on July 26, 2013[11]. The policy describes in detail the criteria for designating an FMI, applicability of PFMIs to the FMIs, oversight of FMIs, list of FMIs regulated by Reserve Bank and other related aspects.

3.65 An Inter-Agency Implementation Group (IAIG) comprising members from RBI, SEBI, and Forward Markets commission (FMC) has been constituted, on the direction of the FSDC Sub-Committee, for monitoring the implementation of Principles for Financial Market Infrastructures (PFMIs) in India. The Clearing Corporation of India Limited (CCIL) has been identified as an important FMI, under the regulation of the Reserve Bank. Accordingly, the inspection CCIL has been carried out. SEBI has also carried out the assessment of five FMIs under its regulations. The assessment of FMIs done by the respective regulators is being reviewed by the members of the implementation group and the final report will be submitted to the FSDC Sub-Committee.

Mobile Banking

3.66 A bank led model for mobile banking has been adopted In India, with only banks which are licensed and supervised in India and having a physical presence in India being permitted to offer mobile banking, with approval from the Reserve Bank. As on date, 78 banks including a few Regional Rural banks (RRBs), Urban Cooperative Banks (UCBs) have been given permission for providing mobile banking services in the country. Helped by the rapid spread of use of mobile telephony, the growth in mobile banking has been encouraging over last three years (Chart 3.7).

Chart 3.7: Trends in Mobile Banking Transactions



[11] http://rbi.org.in/scripts/bs_viewcontent.aspx?Id=2705

3.67 The mobile banking channel has the potential to be one of the key tools for achieving financial inclusion. However, the growth and acceptance of mobile banking as a channel of accessing banking service has been below expectation. Apart from the low levels of awareness and acceptance, the challenges in a faster growth can be attributed to the factors like inability of banks to seed the mobile number with the account number, compatibility of handsets with the mobile banking application, absence of collaboration and revenue sharing models between banks and mobile network operators (MNOs) and inability to get the USD channel in operation for mobile banking *etc.*

Deposit Insurance

Single Customer View

3.68 DICGC extends deposit insurance cover to insured banks according to the provisions contained in the DICGC Act, 1961. In the absence of a comprehensive framework for resolution, DICGC is handicapped by inadequate information sharing regarding depositors, thus leading to delay in making payments to the depositors. At the international level, to expedite the claim settlements, a number of countries such as the UK, Canada and Malaysia have mandated banks to capture data on depositor balances in Single Customer View (SCV) format. In case of banks, a Single Customer View is an aggregated, consistent and holistic representation of the data about the depositors. It provides the deposit insurer a consolidated view of all deposit accounts eligible for deposit insurance coverage, enabling it to manage faster, accurate and efficient claim settlement within minimum time period. SCV is heavily dependent on use of technology and in India, presentation of depositor data as required by DICGC poses various challenges.

Differential Premium System

3.69 Deposit insurance being a part of safety net mechanism plays a crucial role in maintaining financial stability. A system that differentiates premium on the basis of risk profiles of banks have been increasingly adopted worldwide by various countries as it would enable a deposit insurer perform its role more effectively. Its main objectives are to provide incentives for banks to avoid excessive risk taking and introduce more fairness into the premium assessment process. In Indian context, in order to have a differential premium system based on risk profiles of banks, there is a need to have the risk based ratings of the insured banks. The base for differential premium system may be a combination of both quantitative and qualitative criteria. The system of arriving at the ratings for the banks for this purpose will have to be suitably devised keeping in view the objectives of risk based premium system.

Annex-1

Systemic Risk Survey

The Systemic Risk Survey (SRS) was introduced by the Reserve Bank of India in October 2011 to capture the views of market participants and other stakeholders on the aggregate risks facing the financial system. The present survey of October 2013 is the fifth in the series.

Perceptions of market experts have not changed significantly since the previous survey conducted in April 2013. Global and domestic macro-economic risks are perceived as the major risks threatening the financial system. However, the intensity of the global risks within the major risk groups remained unchanged. Market risks and Institutional risks were perceived to have medium impact in these surveys (Figure 1).

The current survey indicates that among the global risks, risk on account of global slowdown has receded slightly and sovereign risks have moved to medium risk from high risk category as perceived in the previous survey, while global funding risks have scaled up from medium to high risk category. On the domestic macro-economic front, deterioration in domestic economic outlook is considered to be most critical, up from medium risk category in previous survey to high risk. Risk from domestic inflation, corporate leverage and household savings have also increased marginally. On the other hand, risks arising from CAD, fiscal, sovereign downgrade and infrastructure were perceived to have receded in the current survey. The foreign exchange risk, asset quality deterioration and additional capital requirements of banks have also been mentioned as other risks (Figure 2). The perception about confidence in the Indian financial system has deteriorated during the past six months (Chart 1).

On likely changes about credit off-take in next three months, respondents felt that credit demand is likely to remain unchanged or may increase marginally. Regarding credit quality, majority of respondents felt that it is likely to deteriorate in the near future (Chart 2).

Figure 1: Major Risk Groups identified in Systemic Risk Surveys – October 2013

Major Risk Groups	Oct-13	Change	Apr-13	Change	Oct-12	Change	Apr-12	Change	Oct-11
A. Global Risks		⇔		⇔		⇑		⇔	
B. Macro-economic Risks		⇑		⇑		⇓		⇓	
C. Market Risks		⇑		⇓		⇓		⇔	
D. Institutional Risks		⇔		⇑		⇔		⇓	
E. General Risks		⇔		⇓		⇔		⇔	

Note:

Risk Category

Very high	High	Medium	Low	Very low

Change in risk since last survey		
⇑	⇔	⇓
Increased	Same	Decreased

The risk perception, as emanates from the systemic risk survey conducted at different time points (on half yearly basis in April and October), may shift (increase/ decrease) from one category to the other, which is reflected by change in colour. However, within the same risk category (i.e. the boxes with same colour), the risk perception may also increase/ decrease or remain the same, which have been shown by the arrows. The shift in risk perception is between to consecutive surveys.

Source: RBI, Systemic Risk Surveys – October 2011 to October 2013 (Half yearly)

Figure 2 : Various Risks identified in Systemic Risk Survey – October 2013

Risk Item		Oct-13	Changes	Apr-13
A. Global Risks	Global slow down		⇩	
	Sovereign Risk / Contagion		⇩	
	Funding Risk (External Borrowings)		⇧	
	Global Inflation / Commodity Price Risk (including crude oil prices)		⇔	
	Other Global Risks		⇧	
B. Macro-economic Risks	Deterioration in domestic economic outlook		⇧	
	Domestic Inflation		⇧	
	Current Account Deficit		⇩	
	Capital inflows/ outflows (Reversal of FIIs, Slow down in FDI)		⇔	
	Sovereign rating downgrade		⇩	
	Fiscal Risk (High Fiscal deficit)		⇩	
	Corporate Sector Risk (High Leverage/ Low Profitability)		⇧	
	Lack / Slow pace of Infrastructure development		⇩	
	Real Estate Prices		⇔	
	Household savings		⇧	
	Political Risk		⇩	
	Other Macroeconomic Risks		⇩	
C. Market Risks	Foreign Exchange Rate Risk		⇧	
	Equity Price Volatility		⇔	
	Funding Risk / Liquidity Risk/ Interest Rate Risk		⇩	
	Other Market Risks		⇧	
D. Institutional Risks	Regulatory Risk		⇔	
	Asset quality deterioration		⇧	
	Additional capital requirements of banks		⇧	
	Funding difficulties of banks		⇩	
	Low credit off-take		⇩	
	Excessive credit growth		⇔	
	Operational Risk		⇩	
	Other Institutional Risks		⇧	
E. General Risks	Terrorism		⇩	
	Natural disaster		⇔	
	Social unrest (Increasing inequality)		⇔	
	Other General Risks		⇔	

Note:

Risk Category

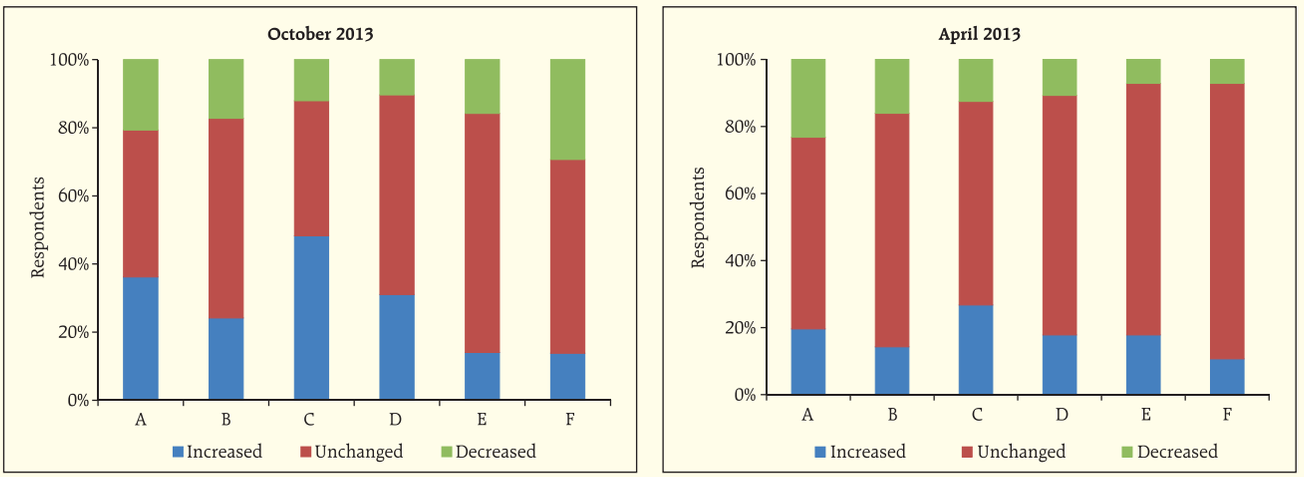
Very high	High	Medium	Low	Very low

Change in risk since last survey		
⇧	⇔	⇩
Increased	Same	Decreased

The risk perception, as emanates from the systemic risk survey conducted at two time points, may shift (increase/ decrease) from one category to the other, which is reflected by change in colour. However, within the same risk category (i.e. the boxes with same colour), the risk perception may also increase/ decrease or remain the same, which have been shown by the arrows.

Source: RBI, Systemic Risk Surveys – April 2013 and October 2013

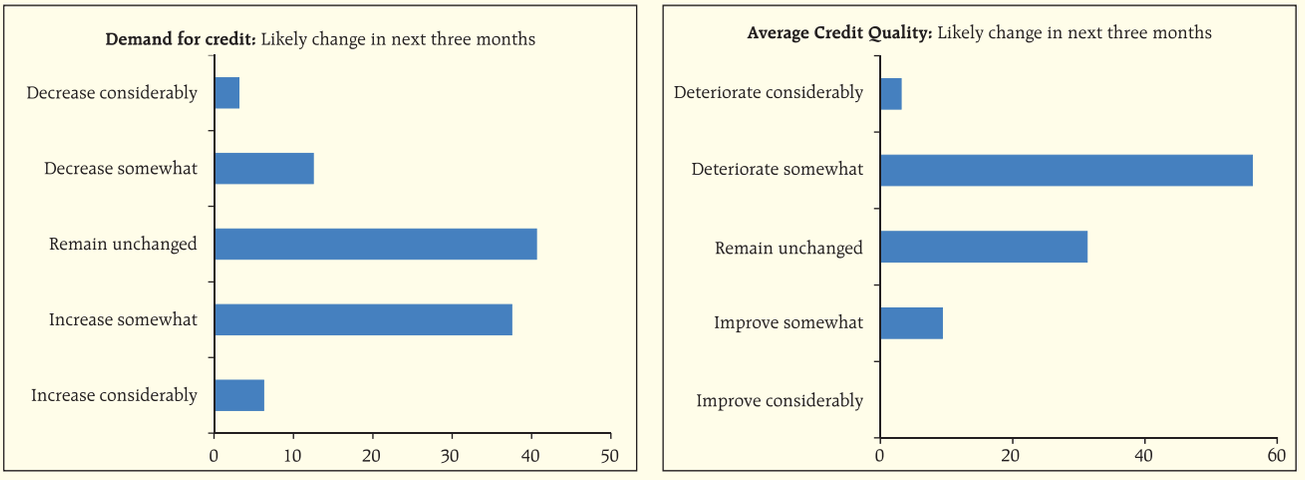
Chart 1: Change in Perception over the past six months



Note: A: High impact event occurring in the global financial system in the period ahead (In Short Term : upto 1 year)
B: High impact event occurring in the global financial system in the period ahead (In Medium Term : 1 to 3 years)
C: High impact event occurring in the Indian financial system in the period ahead (In Short Term : upto 1 year)
D: High impact event occurring in the Indian financial system in the period ahead (In Medium Term : 1 to 3 years)
E: Confidence in the stability of the global financial system as a whole
F: Confidence in the stability of the Indian financial system

Source: RBI, Systemic Risk Surveys – April 2013 and October 2013

Chart 2: Outlook on Credit Demand and its Quality



Source: RBI, Systemic Risk Survey – October 2013

Annex-2

Methodologies

Macroeconomic Stability Map

The Macroeconomic Stability Map is based on seven sub-indices, each pertaining to a specific area of macroeconomic risk. Each sub-index on macroeconomic risk includes select parameters representing risks in that particular field. These sub-indices have been selected based on their impact on macroeconomic or financial variable such as GDP, inflation, interest rates or asset quality of banks. The seven sub-indices of the overall macroeconomic stability index and their components are briefly described below:

Global Index: The global index is based on output growth of the world economy. A fall in output growth affects overall sentiments for the domestic economy in general and has implications on demand for domestic exports, in particular. Capital flows to the domestic economy are also affected by growth at the global level. Therefore, a fall in output growth is associated with increased risks.

Domestic Growth: The domestic growth index is based on growth of gross domestic product. A fall in growth, usually, creates headwinds for banks' asset quality, capital flows and over-all macroeconomic stability. Hence, a fall in growth is associated with increased risks.

Inflation: Wholesale Price Index based inflation is used to arrive at the Inflation Index. Increase in inflation reduces purchasing power of individuals and complicates investment decision of corporates. Therefore, an increase in inflation is associated with higher risks.

External Vulnerability Index: The current account deficit (CAD) to GDP ratio, reserves cover of imports and ratio of short term debt to total debt are included in the External Vulnerability Index. Rising CAD and ratio of short term debt to total debt and falling reserves cover of imports depict rising vulnerability.

Fiscal Index: The Fiscal Index is based on fiscal deficit and primary deficit. Higher deficits are associated with higher risk. High government deficit, in general, reduces the resources available to the private sector for investment and also has implications for inflation.

Corporate Index: The health of the corporate sector is captured through profit margin [EBITDA (earnings before interest, tax, depreciation and amortisation) to sales] and the interest coverage ratio [EBIT (earnings before interest, tax) to interest payments]. Lower profit margin and lower interest coverage ratio are associated with higher risks.

Household Index: This index is based on retail non-performing assets, an increase in retail NPAs is associated with higher risk.

Corporate sector Stability Indicator and Map

The Corporate sector Stability Indicator and Map have been constructed using the following method:

Data: The balance sheet data of non-government non-financial public limited companies.

Frequency: Annual (1992-93 to 2013-14). For 2012-13 and 2013-14, the half-yearly balance sheet data is used for the analysis.

Following ratios have been used for the analysis (considering 5 dimensions):

a. Profitability : RoA(Gross Profit/Total Assets) #, Operating Profit/Sales #, Profit After Tax/Sales #;

b. Leverage : Debt/ Assets, Debt/ Equity; (Debt is taken as Total Borrowings)

c. Sustainability : Interest Coverage Ratio (EBIT to interest expenses) #, interest expenses/total expenditure;

d. Liquidity : Quick Assets/ Current Liabilities (quick ratio) #;

e. Turn-Over : Total Sales / Total Assets #.

Negatively related to risk.

First, the ratios were converted into standard normal variate [$z = \frac{x-\mu}{\sigma}$]. Then, z's were bounded between 0 and 1 using relative distance transformation [$d = \frac{z-\min(z)}{\max(z)-\min(z)}$]. For (#) negatively related ratios (to risk), one's complement was used. For each dimension a composite index was derived as a simple average of relevant d's (principal component analysis also gives equal weights). The Map is constructed using composite index for each dimension.

The overall corporate sector stability indicator is a weighted average of 5 dimensions. The weights are obtained using principal component analysis (PCA). The derived weights for 5 dimensions are as follows:

Profitability	Leverage	Sustainability	Liquidity	Turn-Over
25%	25%	25%	10%	15%

Systemic Liquidity Index

Systemic liquidity in the financial system refers to the liquidity scenario in the banking sector, non-banking financial sector, the corporate sector and the prevailing foreign currency liquidity. Current needs for liquidity are also influenced by the expectations about the availability of funds and their rates in future. The Systemic Liquidity Index (SLI) was constructed using the following four indicators representing various segments of the market:

- Weighted Average Call Rate minus RBI Repo Rate
- 3 month Commercial Paper (CP) Rate minus 3 month Certificate of Deposits (CD) Rate
- 3 month CD Rate minus 3 month Forward Implied Deposit Rate
- Weighted Average Call Rate minus 3 Month Overnight Index Swap (OIS) Rate

The SLI was derived as a simple average of the Standard normal or Variance-equal transformed values of the above mentioned indicators.

Banking Stability Map and Indicator

The Banking Stability Map and Indicator (BSI) present an overall assessment of changes in underlying conditions and risk factors that have a bearing on stability of the banking sector during a period. Following ratios are used for construction of each composite index:

Ratios used for construction of Banking Stability Map and Banking Stability Indicator				
Dimension	**Ratios**			
Soundness	CRAR #	Tier-I Capital to Tier-II Capital #	Leverage ratio as Total-Assets to Capital and Reserves	
Asset-Quality	Net NPAs to Total-Advances	Gross NPAs to Total-Advances	Sub-Standard-advances to gross NPAs #	Restructured-Standard-Advances to Standard-Advances
Profitability	Return on Assets #	Net Interest Margin #	Growth in Profit #	
Liquidity	Liquid-Assets to Total-Assets #	Customer-Deposits to Total-Assets #	Non-Bank-Advances to Customer-Deposits	Deposits maturing within-1-year to Total Deposits
Efficiency	Cost to Income	Business (Credit + Deposits) to staff expenses #		Staff Expenses to Total Expenses

Negatively related to risk.

The five composite indices represent the five dimensions of Soundness, Asset-quality, Profitability, Liquidity and Efficiency. Each composite index, representing a dimension of bank functioning, takes values between zero (minimum) and 1 (maximum). Each index is a relative measure during the sample period used for its construction, where a high value means the risk in that dimension is high. Therefore, an increase in the value of the index in any particular dimension indicates an increase in risk in that dimension for that period as compared to other periods. For each ratio used for a dimension, a weighted average for the banking sector is derived, where the weights are the ratio of individual bank asset to total banking system assets. Each index is normalised for the sample period as 'Ratio-on-a-given-date minus Minimum-value-in-sample-period divided by Maximum-value-in-sample-period minus Minimum-value-in-sample-period'. A composite index of each dimension is calculated as a weighted average of normalised ratios used for that dimension, where the weights are based on the marks assigned for assessment for CAMELS rating. Based on the individual composite index for each dimension, the Banking Stability Indicator is constructed as a simple average of these five composite sub-indices.

Banking Stability Measures (BSMs) – Distress Dependency Analysis

In order to model distress dependency, methodology described by Goodhart and Segoviano (2009) has been followed. First, the banking system has been conceptualised as a portfolio of banks(BIs). Then, the PoD of the individual banks, comprising the portfolio, has been inferred from equity prices. Subsequently, using such PoDs as inputs (exogenous variables) and employing the Consistent Information Multivariate Density Optimizing (CIMDO) methodology (Segoviano, 2006), which is a non-parametric approach based on cross-entropy, the banking system's portfolio multivariate density (BSMD) have been derived. Lastly, from the BSMD a set of conditional PoDs of specific pairs of BIs, and the banking system's joint PoD(JPoD) are estimated.

The BSMD and thus, the estimated conditional probabilities and the JPoD, embed the banks' distress dependency. This captures the linear (correlation) and non-linear dependencies among the BIs in the portfolio, and allows for these to change throughout the economic cycle. These are key advantages over traditional risk models that most of the time incorporate only correlations, and assume that they are constant throughout the economic cycle.

The BSMs uses the following indicators of distress dependency:

Banking Stability Index (BSI): The expected number of banks that could became distressed given that at least one bank has become distressed.

Toxicity Index (TI): The average probability that a bank under distress may cause distress to another bank in the system.

Vulnerability Index (VI): The average probability of a bank coming under distress given distress in other banks in the system.

Network Analysis

Matrix algebra is at the core of network analysis, which is essentially an analysis of bilateral exposures between entities in the financial sector. Each institution's lending and borrowings with all others in the system are plotted in a square matrix and are then mapped in a network graph. The network model uses various statistical measures to gauge the level of interconnectedness in the system. Some of the most important are as follows:

Connectivity: This is a statistic that measures the extent of links between the nodes relative to all possible links in a complete graph.

Cluster Coefficient: Clustering in networks measures how interconnected each node is. Specifically, there should be an increased probability that two of a node's neighbours (banks' counterparties in case of the financial

network) are also neighbours themselves. A high clustering coefficient for the network corresponds with high local interconnectedness prevailing in the system.

Shortest Path Length: This gives the average number of directed links between a node and each of the other nodes in the network. Those nodes with the shortest path can be identified as hubs in the system.

In-betweeness centrality: This statistic reports how the shortest path lengths pass through a particular node.

Eigen vector measure of centrality: Eigenvector centrality is a measure of the importance of a node (bank) in a network. It describes how connected a node's neighbours are and attempts to capture more than just the number of out degrees or direct 'neighbours' a node has. The algorithm assigns relative centrality scores to all nodes in the network and a bank's centrality score is proportional to the sum of the centrality scores of all nodes to which it is connected. In general, for an NxN matrix there will be N different eigen values, for which an eigen vector solution exists. Each bank has a unique eigen value, which indicates its importance in the system. This measure is used in the network analysis to establish the systemic importance of a bank and by far it is the most crucial indicator.

Tiered Network Structures: Typically, financial networks tend to exhibit a tiered structure. A tiered structure is one where different institutions have different degrees or levels of connectivity with others in the network. In the present analysis, the most connected banks (based on their eigen vector measure of centrality) are in the inner most core. Banks are then placed in the mid core, outer core and the periphery (the respective concentric circles around the centre in the diagrams), based on their level of relative connectivity. The range of connectivity of the banks is defined as a ratio of each bank's in degree and out degree divided by that of the most connected bank. Banks that are ranked in the top 10 percentile of this ratio constitute the inner core. This is followed by a mid core of banks ranked between 90 and 70 percentile and a 3rd tier of banks ranked between 40 and 70 percentile. Banks with connectivity ratio of less than 40 per cent are categorised as the periphery.

Solvency Contagion analysis

The contagion analysis is basically a stress test where the gross loss to the banking system owing to a domino effect of one or more bank failing is ascertained. We follow the round by round or sequential algorithm for simulating contagion that is now well known from Furfine (2003). Starting with a trigger bank 'i' that fails at time 0, we denote the set of banks that go into distress at each round or iteration by Dq, q= 1,2, …For this analysis, a bank is considered to be in distress when its core CRAR goes below 6 per cent. The net receivables have been considered as loss for the receiving bank.

Liquidity Contagion analysis

While the solvency contagion analysis assesses potential loss to the system owing to failure of a net borrower, liquidity contagion estimates potential loss to the system due to the failure of a net lender. The analysis is conducted on gross exposures between banks. The exposures include fund based and derivatives. The basic assumption for the analysis is that a bank will initially dip into its liquidity reserves or buffers to tide over a liquidity stress caused by the failure of a large net lender. The items considered under liquidity reserves are (a) excess CRR balance; (b) excess SLR balance; (c) available marginal standing facility and (d) available export credit refinance. If a bank is able to meet the stress with the liquidity buffers alone, then there is no further contagion.

However, if the liquidity buffers alone are not sufficient, then a bank will call in all loans that are 'callable', resulting in a contagion. For the analysis only short term assets like money lent in the call market and other very short term loans are taken as callable. Following this, a bank may survive or may be liquidated. In this case there

might be instances where a bank may survive by calling in loans, but in turn might propagate a further contagion causing other banks to come under duress. The second assumption used is that when a bank is liquidated, the funds lent by the bank are called in on a gross basis, whereas when a bank calls in a short term loan without being liquidated, the loan is called in on a net basis (on the assumption that the counterparty is likely to first reduce its short term lending against the same counterparty).

Estimation of Losses: Expected Loss, Unexpected Loss and Expected Shortfall of SCBs

The following standard definitions have been used for estimation of these losses:

Expected Loss (EL) : The EL is the average credit loss that the banking system expects from their credit exposure.

Unexpected Loss (UL) : The UL at 100(1-α) per cent-level of significance is the loss that may occur at the α-quantile of the loss distribution.

Expected Shortfall (ES) : When the distributions of loss (Z) are continuous, expected shortfall at the 100(1-α) per cent confidence level (ESα (Z)) is defined as, ESα (Z) = E[Z – Z$\geq$VaRα (Z)]. Hence, Expected shortfall is the conditional expectation of loss given that the loss is beyond the VaR level.

These losses were estimated as: Loss = PD X LGD X EAD

Where, EAD = Exposure at Default, is the total advances of the banking system. EAD includes only on-balance sheet items as PD was derived only for on balance sheet exposures.

LGD = Loss Given Default. Under baseline scenario, the average LGD was taken as 60 per cent as per the RBI guidelines on '*Capital Adequacy – The IRB Approach to Calculate Capital Requirement for Credit Risk*'. LGD was taken at 65 per cent and 70 per cent under medium and severe macro-economic conditions, respectively.

PD = Probability of Default. PD was defined as gross non-performing advances to total advances ratio. Because of unavailability of data on number of default accounts, the size of default accounts (*i.e.* NPA amount) has been used for derivation of PDs.

The above losses *viz., EL, UL and ES*, were estimated by using a simulated PD distribution. As a first step; an empirical distribution of the PD was estimated using Kernel Density Estimate, second; using the empirically estimated probability density function, 20000 random numbers were drawn based on Monte Carlo Simulation and finally, for calculation of expected loss, unexpected loss and expected shortfall, PDs were taken as average PD, 99.9 per cent VaR of PD and average PD beyond 99.9 per cent loss region, respectively.

Macro Stress Testing

To ascertain the resilience of banks against macroeconomic shocks, macro stress test for credit risk was conducted. Here, the credit risk indicator was modeled as function of macroeconomic variables, using various econometric models that relate banking system aggregate to the macroeconomic variables. The time series econometric models being used are; (i) multivariate regression in terms of the slippage ratio; (ii) aggregate VAR using slippage ratio; (iii) quantile regression of slippage ratio, (iv) multivariate panel regression on bank-group wise slippage ratio data; and (v) multivariate regressions for sectoral NPAs. The banking system aggregates includes current and lagged values of slippage ratio, while macroeconomic variables include GDP growth, short term interest rate (call rate), WPI inflation, exports-to-GDP ratio $\left(\frac{Ex}{GDP}\right)$, gross fiscal deficit-to-GDP ratio $\left(\frac{GFD}{GDP}\right)$ and REER.

While the multivariate regression allows evaluating the impact of selected macroeconomic variables on the banking system's NPA and capital, the VAR model reflects the impact of the overall economic stress situation on the banks' capital and NPA ratio, which also take into account feed-back effect. In these methods, conditional mean of slippage[1] ratio is estimated and assumed that the impact of macro variables on credit quality will remain same irrespective of the level of the credit quality, which may not always be true. In order to relax this assumption, quantile regression has been adapted to project credit quality, in which, in place of conditional mean the conditional quantile has been estimated.

The Modelling Framework

The following multivariate models were run to estimate the impact of macroeconomic shocks on the GNPA ratio/ slippage ratio (SR)[2]:

- *Aggregate banking system multivariate regression*

  The analysis was carried out on slippage ratio at the aggregate level for the commercial banking system as a whole.

$$SR_t = \alpha_1 + \beta_1 SR_{t-1} - \beta_2 \Delta GDP_{t-2} + \beta_3 Call_{t-1} - \beta_4 \left(\frac{Ex}{GDP}\right)_{t-2} + \beta_5 \Delta WPI_t + \beta_6 \left(\frac{GFD}{GDP}\right)_{t-1}$$

  Where, $\alpha_1, \beta_1, \beta_2, \beta_3, \beta_4, \beta_5$ and $\beta_6 > 0$.

- *Vector AutoRegression (VAR)*

  In notational form, mean-adjusted VAR of order p (VAR(p)) can be written as

$$y_t = A_1 y_{t-1} + \ldots\ldots + A_p y_{t-p} + u_t \quad ; \; t=0,1,2,3,\ldots.$$

  Where, $y_t = (y_{1t}, \ldots\ldots, y_{Kt})'$ is a (K×1) vector of variables at time t, the A_i (i=1,2,...p) are fixed (K×K) coefficient matrices and $u_t = (u_{1t}, \ldots\ldots, u_{Kt})'$ is a K-dimensional white noise or innovation process.

  In order to estimate, VAR system, slippage ratio, call rate, inflation, growth and REER were selected. The appropriate order of VAR has been selected based on minimum information criteria as well as other diagnostics and suitable order was found to be two. Accordingly, VAR of order 2 (VAR(2)) was estimated and stability of the model was checked based on roots of AR characteristic polynomial. Since, all roots are found to be inside the unit circle, this selected model was found to be fulfilling the stability condition. The impact of various macroeconomic shocks was determined using impulse response function of the selected VAR.

- *Quantile Regression*

  In order to estimate slippage ratio at desired level of conditional quantile, following quantile regression at median (which is the present quantile of slippage ratio) was used:

$$SR_t = \alpha_1 - \beta_1 SR_{t-1} - \beta_2 \Delta GDP_{t-1} + \beta_3 Call_{t-4} - \beta_4 \left(\frac{Ex}{GDP}\right)_{t-1} + \beta_5 \Delta WPI_t + \beta_6 \left(\frac{GFD}{GDP}\right)_{t-1}$$

  Where, $\alpha_1, \beta_1, \beta_2, \beta_3, \beta_4, \beta_5$ and $\beta_6 > 0$.

[1] Slippages are the fresh accretion to NPAs during a period. Slippage Ratio = Fresh NPAs / Standard Advances at the beginning of period.
[2] Slippage ratio, exports/GDP, and the call rate are seasonally adjusted.

- *Bank-group wise panel fixed-effect regression*

  Bank-group wise slippage ratios were estimated using the following fix effect panel regression.

$$SR_{it} = \alpha_i + \beta_1 SR_{i(t-1)} - \beta_2 \Delta GDP_{t-1} + \beta_3 Call_{t-2} - \beta_4 \left(\frac{Ex}{GDP}\right)_{t-1}$$

  where, α_i is the bank-group specific parameter and $\beta_1, \beta_2, \beta_3,$ and $\beta_4 > 0$.

- *Sectoral multivariate regression*

  The impact of macroeconomic shocks on various sectors was assessed by employing multivariate regression models using aggregate NPA ratio for each sector separately. The dependent variables consisted of lagged NPAs, sectoral GDP growth, inflation, and short-term interest rate.

  Derivation of the NPAs from the slippage ratios, which were projected from the above mentioned credit risk econometric models, were based on the following assumptions: credit growth of 15 per cent; recovery rate of 7.5 per cent, 5.7 per cent, 5.7 per cent and 6.3 per cent during March, June, September and December quarters, respectively; write-offs rate of 6.5 per cent, 3.0 per cent, 2.3 per cent and 4.6 per cent, during March, June, September and December respectively.

  There are various components of profit after tax (PAT) of banks, like, interest income other income, operating expenses, provisions, *etc.*, hence, these components are projected using different time series econometric models (as given below) and finally PAT was estimated using the following identity:

$$PAT = NII + 001 - OE - Provisions - Income\ Tax$$

  Where; NII is Net Interest Income, OOI is Other Operating Income and OE is Operating Expenses.

  Net Interest Income (NII): The NII which is the difference between interest income and interest expenses is projected using the following regression equation;

$$LNII_t = -\alpha_1 + \beta_1 \times LNII_{t-1} + \beta_2 \times LNGDP\_SA_{t-1} + \beta_3 \times Adv\_Gr_{t-1} + \beta_4 \times Spread_t$$

  Where, $\alpha_1, \beta_1, \beta_2, \beta_3,$ and $\beta_4 > 0$. LNII is log of NII. LNGDP_SA is seasonally adjusted log of nominal GDP at factor cost. Adv_Gr is y-o-y growth rate of advances. Spread is the difference between average interest rate earned by the interest earning assets and average interest paid on the interest bearing liabilities.

  Other Operating Income (OOI): The OOI of SCBs was projected using the following regression;

$$LOOI_t = -\alpha_1 + \beta_1 \times LOOI_{t-1} + \beta_2 \times LNGDP\_SA_t$$

  Where, α_1, β_1 and $\beta_2 > 0$.

  Operating Expenses (OE): The OE of SCBs was projected using Autoregressive Moving Average (ARMA) model.

  Provision: The required provisioning was projected using the following regression;

$$P\_Adv_t = \alpha_1 + \beta_1 \times P\_Adv_{t-1} - \beta_2 \times RGDP\_Gr_{t-2} + \beta_3 \times GNPA_{t-1} - \beta_4 \times Dummy$$

  Where, $\alpha_1, \beta_1, \beta_2, \beta_3,$ and $\beta_4 > 0$. P_Adv is provisions to total advances ratio. RGDP_Gr is y-o-y growth rate of real GDP. GNPA is gross non performing advances to total advances ratio. Dummy is a time dummy.

  Income Tax: The required income tax was taken as 32 per cent of the profit before tax, which is based on the past trend of ratio of income tax to profit before tax.

  Finally, impact on CRAR was estimated based on the PAT estimated as mentioned above. RWA growth is assumed as 17.5 per cent. The regulatory capital growth is assumed to remain at the minimum by assuming

minimum mandated transfer of 25 per cent of the profit to the reserves account. The projected values of the ratio of the non-performing advances were translated into capital ratios using the "balance sheet approach", by which capital in the balance sheet is affected via the provisions and net profits.

Single Factor Sensitivity Analysis – Stress Testing

As a part of quarterly surveillance, stress tests are conducted covering credit risk, interest rate risk, liquidity risk *etc.* Resilience of the commercial banks in response to these shocks is studied. The analysis is done on individual scheduled commercial bank as well as on the aggregated-system.

Credit Risk

To ascertain the resilience of banks, the credit portfolio was given a shock by increasing NPA levels, for the entire portfolio. For testing the credit concentration risk, default of the top individual borrower(s) and the largest group borrower was assumed. The analysis was carried out both at the aggregate level as well as at the individual bank level, based on supervisory data as on September 30, 2013. The assumed increase in NPAs was distributed across sub-standard, doubtful and loss categories in the same proportion as prevailing in the existing stock of NPAs. The provisioning norms used for these stress tests were based on existing average prescribed provisioning for different asset categories. The provisioning requirements were taken as 25, 75 and 100 per cent for sub-standard, doubtful and loss advances, respectively. These norms were applied on the additional NPAs, calculated under a stress-scenario. As a result of assumed increase in NPAs, loss of income on the additional NPAs for one quarter was also included in total losses in addition to additional provisioning requirements. The estimated provisioning requirements so derived were deduced from banks' capital and stressed capital adequacy ratios were derived.

Interest rate risk

The fall in value of the portfolio or income losses due to the shifting of INR yield curve are accounted for the total loss of the banks because of the assumed shock. The estimated total losses so derived were reduced from the banks' capital.

For interest rate risk in the banking book, Duration Analysis approach was considered, for computation of the valuation impact (portfolio losses) on the investment portfolio. The portfolio losses on investments were calculated for each time bucket based on the applied shocks. The resultant losses/gains were used to derive the impacted CRAR. The valuation impact for the tests on banking book was calculated under the assumption that the HTM portfolio would be marked to market. In a separate exercise for interest rate shocks in trading book, the valuation losses were calculated for each time bucket on the interest bearing assets using duration approach.

Liquidity Risk

The aim of liquidity stress tests is to assess the ability of a bank to withstand unexpected liquidity drain without taking recourse to any outside liquidity support. The analysis is done as at end-September 2013. Various scenarios depict different proportions (depending on the type of deposits) of unexpected deposit withdrawals on account of sudden loss of depositors' confidence and assess the adequacy of liquid assets available to fund them.

Assumptions in the liquidity stress test are as follows:

- It is assumed that banks would meet stressed withdrawal of deposits through sale of liquid assets only.
- The sale of investments is done with a hair cut of 10 per cent of their market value.
- The stress test is done on a static mode.

Stress Testing of Derivatives Portfolio of Select Banks

The stress testing exercise focused on the derivatives portfolio of a representative sample set of top 24 banks in terms of notional value of derivatives portfolio. Each bank in the sample was asked to assess the impact of stress conditions on their respective derivatives portfolios.

In case of domestic banks, the derivatives portfolio of both domestic and overseas operations was included. In case of foreign banks, only the domestic (*i.e.* Indian) position was considered for the exercise. For derivatives trade where hedge effectiveness was established was exempted from the stress tests, while all other trades were included.

The stress scenarios incorporated four sensitivity tests consisting of the spot USD/INR rate and domestic interest rates as parameters

Shocks for Sensitivity Analysis

	Domestic Interest Rates	
Shock 1	Overnight	**+2.5 percentage points**
	Upto 1yr	**+1.5 percentage points**
	Above 1yr	**+1.0 percentage points**

	Domestic Interest Rates	
Shock 2	Overnight	**-2.5 percentage points**
	Upto 1yr	**-1.5 percentage points**
	Above 1yr	**-1.0 percentage points**

	Exchange rates	
Shock 3	USD/INR	**+20 per cent**

	Exchange Rates	
Shock 4	USD/INR	**-20 per cent**

Scheduled Urban Co-operative Banks

Credit Risk

Stress tests on credit risk were conducted on Scheduled Urban Co-operative Banks (SUCBs) using their asset portfolio as at end-September 2013. The tests were based on single factor sensitivity analysis. The impact on CRAR was studied under four different scenarios. The assumed scenarios were as under:

- Scenario I: 50 per cent increase in GNPA (classified into sub-standard advances).
- Scenario II: 50 per cent increase in GNPA (classified into loss advances).
- Scenario III: 100 per cent increase in GNPA (classified into sub-standard advances).
- Scenario IV: 100 per cent increase in GNPA (classified into loss advances).

Liquidity Risk

Liquidity stress test based on cash flow basis in 1-28 days time bucket was also conducted, where mismatch [negative gap (cash inflow less than cash outflow)] exceeding 20 per cent of outflow was considered stressful.

- Scenario I: Cash out flows in 1-28 days time bucket goes up by 50 per cent (no change in cash inflows).
- Scenario II: Cash out flows in 1-28 days time bucket goes up by 100 per cent (no change in cash inflows).

Non-Banking Financial Companies (ND-SI)

Credit Risk

Stress tests on credit risk were conducted on Non-Banking Financial Companies (includes both Deposits Taking and Non-Deposit taking and Systemically Important) using their asset portfolio as at end-September 2013. The tests were based on single factor sensitivity analysis. The impact on CRAR was studied under two different scenarios;

- Scenario I: GNPA increased two times from the current level.
- Scenario II: GNPA increased 5 times from the current level.

The assumed increase in NPAs was distributed across sub-standard, doubtful and loss categories in the same proportion as prevailing in the existing stock of NPAs. The additional provisioning requirement was adjusted from the current capital position. The stress was conducted at individual NBFCs as well as at an aggregate level.